THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXIV. No. 1903.] LONDON, OCTOBER 31, 1899. [51ST YEAR. PRICE 6d.

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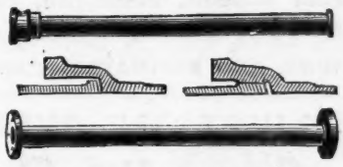

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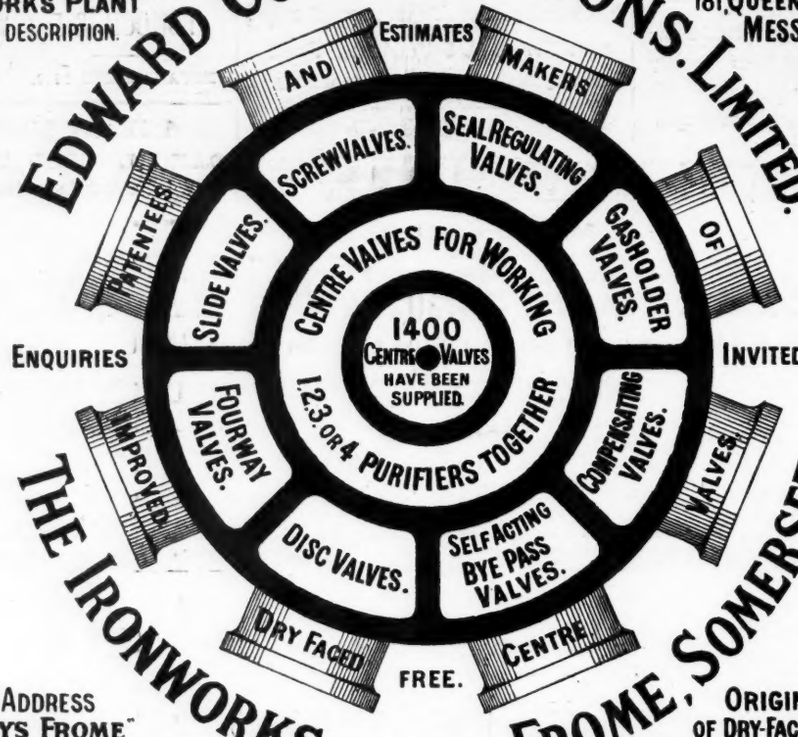

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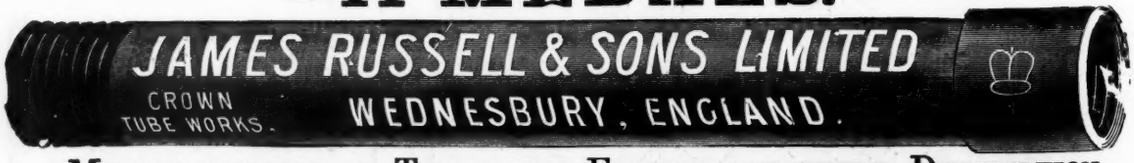

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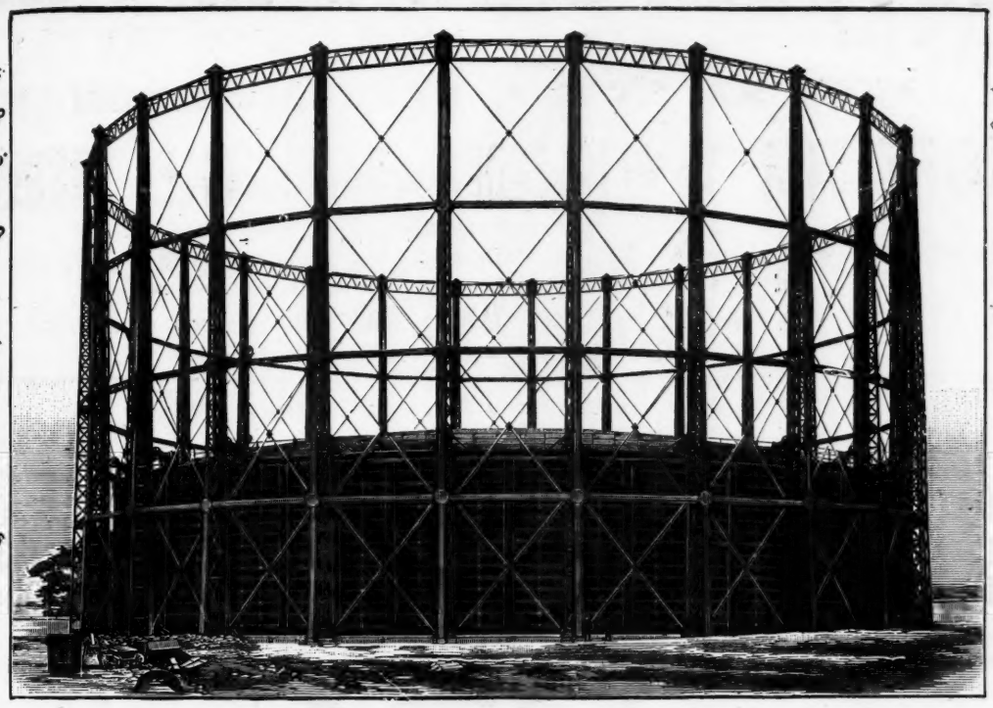

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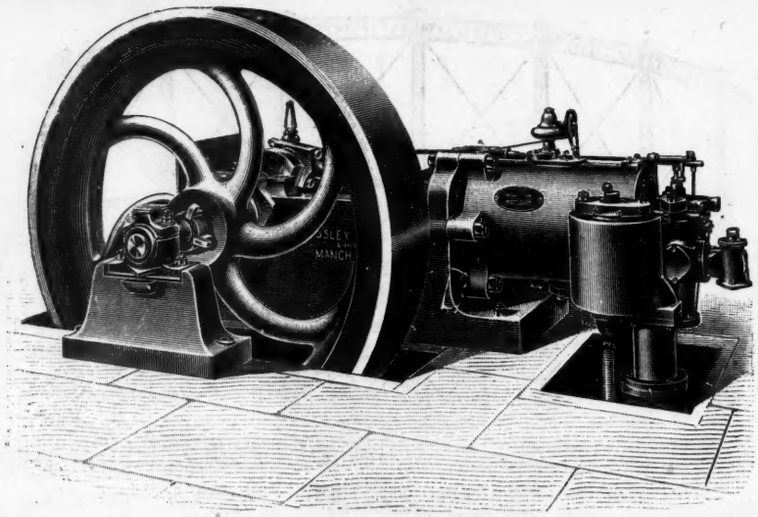

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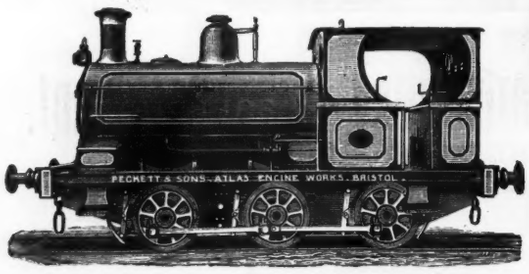

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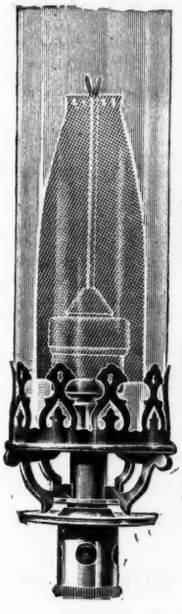

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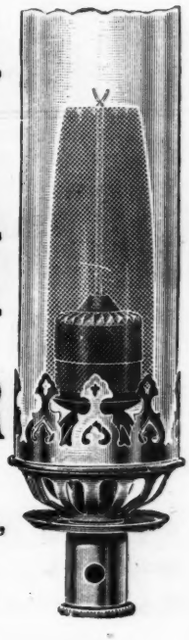

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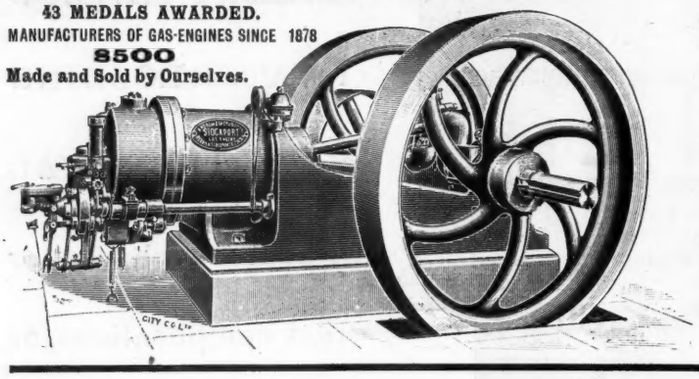

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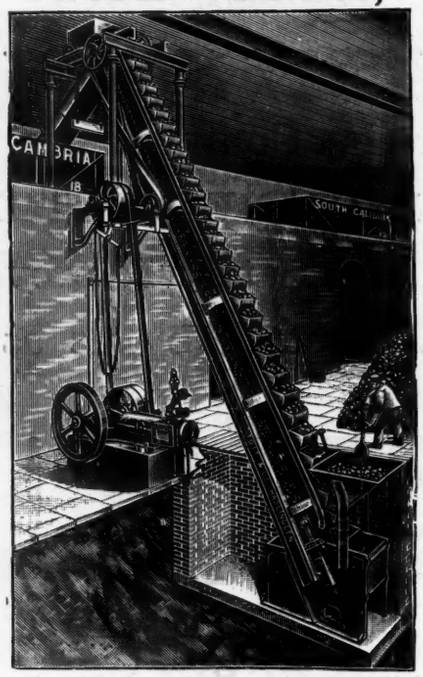

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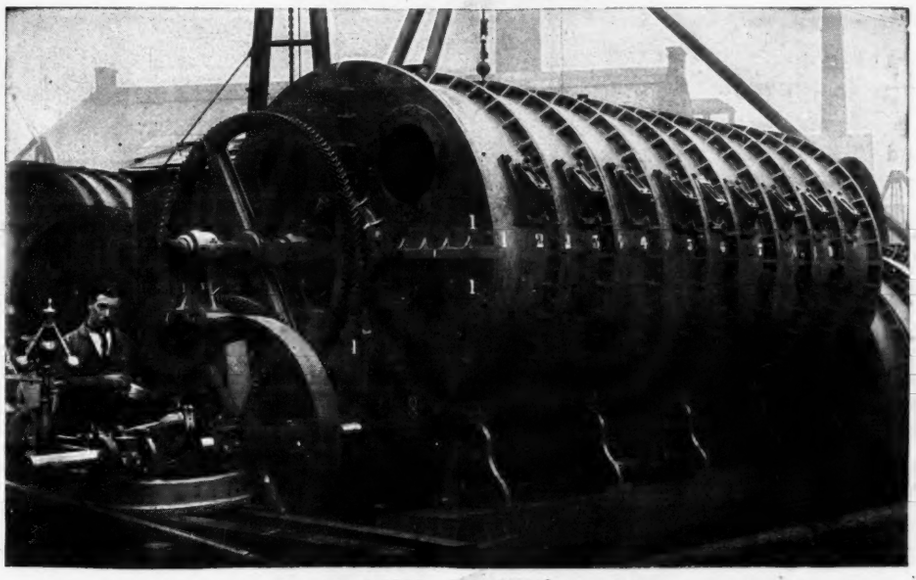

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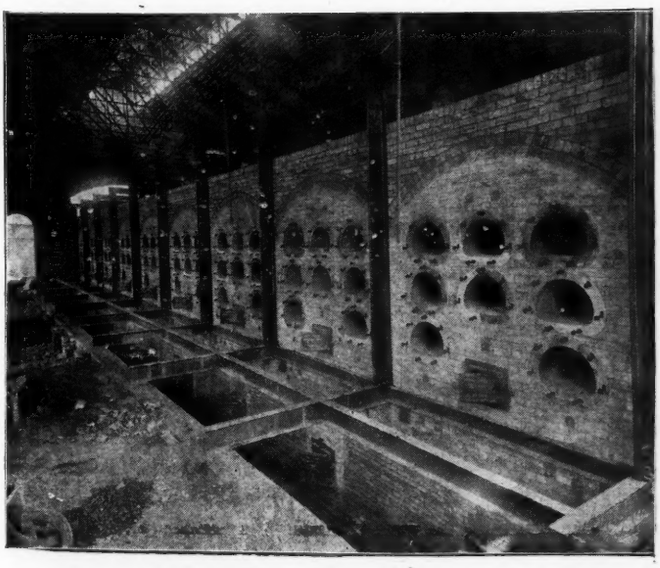

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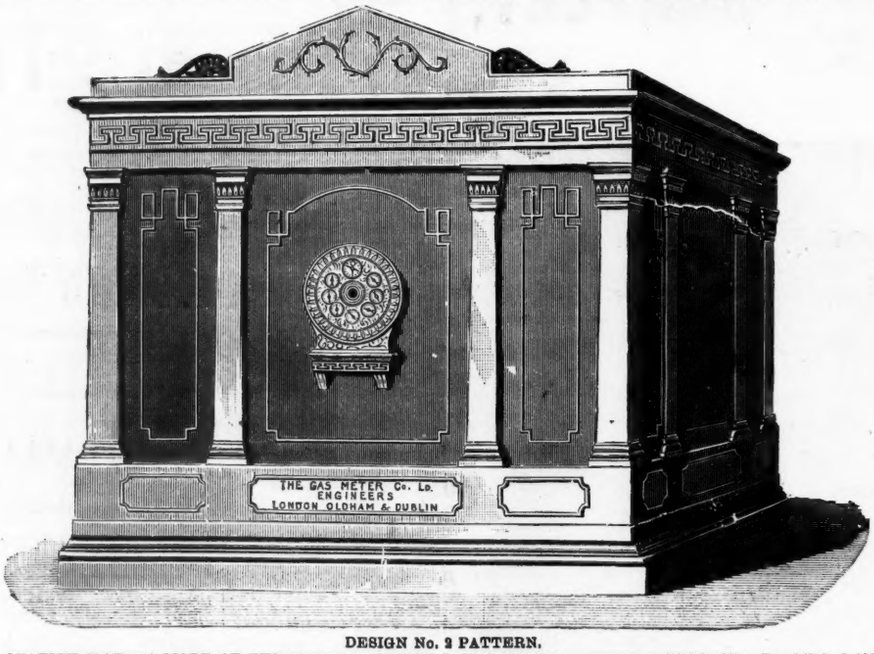

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Copenhagen (Second Contract)	2,500,000	Commercial (Second Contract)	850,000
Belfast	1,700,000	Commercial (Third Contract)	1,250,000
Belfast (Second Contract)	4,500,000	Croydon	1,250,000
Brussels	700,000	L. & N.W. Railway, Crewe	700,000
Brussels (Second Contract)	700,000	Taunton	225,000
Liverpool	3,500,000	Lawrence, Mass.	400,000
Liverpool (Second Contract)	4,500,000	Rotterdam	850,000
Tottenham	750,000	Dorking	125,000
Tottenham (Second Contract)	750,000	McKeesport, Pa.	500,000
Santiago de Cuba	400,000	The Gaslight and Coke Co., Bromley	3,750,000
Swansea	750,000	The Gaslight and Coke Co., Nine Elms	2,750,000
Manchester	3,000,000	Durham	200,000
Brighton	1,750,000	New York (Remodelled)	11,000,000
Preston	1,500,000	Scarborough	800,000
New York	1,200,000	Perth, W.A.	125,000
Southport	750,000	Bremen	550,000
Bath	1,000,000	Maidenhead	225,000
Newburgh, N.Y.	350,000	Epsom	225,000
Newburgh, N.Y. (Second Contract)	250,000	North Middlesex	150,000
Hoylake	125,000	Wandsworth and Putney	1,800,000
Coventry	600,000	Aarhus	800,000
Coventry (Second Contract)	600,000	Falmouth	150,000
Bordentown, N.J.	125,000	Southampton	800,000
Winchester	200,000	Hartlepool	750,000
Shanghai	225,000	Utrecht	1,000,000
Stockport	500,000	Deventer	150,000
Norwich	1,000,000	Portsmouth	1,000,000
Holyoke, Mass.	600,000	Bournemouth	1,000,000
Lea Bridge	350,000	Aylesbury	150,000
Lea Bridge (Second Contract)	350,000	Hamburg	1,750,000
Stockton-on-Tees	500,000	Dublin	2,000,000
St. Joseph, Mo.	750,000	Redhill	275,000
Edinburgh	2,000,000	Stockport (Second Contract)	500,000
Guildford	350,000	Brighton (Second Contract)	1,750,000
Brentford	1,200,000	Croydon (Second Contract)	625,000
Bridlington	125,000	Maidenhead (Second Contract)	225,000
Syracuse, N.Y.	850,000	The Gaslight and Coke Co., Beckton	2,250,000
Middlesbrough	1,250,000	The Gaslight and Coke Co., Fulham	1,750,000

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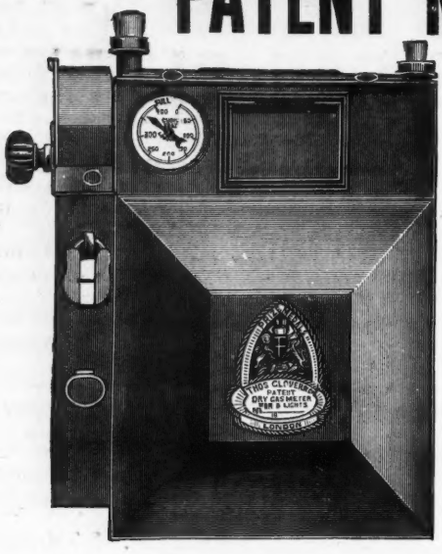

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EDITORIAL NOTES.

Mr. A. C. Humphreys and the American Gas Industry.

THE Annual Meeting of the American Gaslight Association has just been held in New York, under the presidency of Mr. A. C. Humphreys, who is by this time as well known "on this side" as in his native land. If it were said, in addition, that he probably is, if anything, a more general favourite among his professional brethren of the United Kingdom, the observation would be no less true than complimentary. For whereas Mr. Humphreys is known here as the able and enterprising innovator to whom, and to his partner Mr. Glasgow, the British gas industry chiefly owes the reinforcement of practical carburetted water gas, in the United States he was originally known to fame as the leading spirit of the most aggressive of gas "trusts." In the hands of Mr. Humphreys, the United Gas Improvement Company went ahead both fast and far. American business men are accustomed to this sort of thing. Competition is unlimited; and Mr. Humphreys had more to do than anybody with making carburetted water gas an effective weapon for use in this way. It is, of course, rival capitalists who make competition; Mr. Humphreys only "engineered" it. Circumstances alter cases. In the United States, nothing is more common than for commercial interests born and nurtured in competition to find themselves in their sleek middle age attacked in their turn. Mr. Humphreys seems to have come to the conclusion that established gas interests have a good deal to complain of in the actual state of affairs. The price of gas oil has gone up to such a figure that he really thinks the vogue of carburetted water gas has been pushed too far! Many gas companies have gone over to water-gas manufacture who would have done better if they had stuck to coal; and this has put up the price of oil against the concerns that had no such choice of systems. If things go much worse, the water-gas companies will have to become their own oil suppliers.

The curious case of Boston naturally attracted attention. Here, a scheme on a very large scale for distributing illuminating gas made as a bye-product of coke manufacture is in course of exploitation. We shall take an early opportunity for making "JOURNAL" readers acquainted with the nature of this experiment, from particulars that have recently come to hand. It is the realization of an idea that has often been discussed in these columns. Meanwhile, Mr. Humphreys certifies that everything that money can do has been forthcoming to invite success. The situation of the undertaking, moreover, is favourable; there being a good local market for the metallurgical coke which is the primary product. The references by Mr. Humphreys to the merits of this venture are very guarded. It is not his speciality, anyhow. His present interest is in advocating a judicious blend of coal gas and carburetted water gas for the larger class of undertakings on the American Continent. A remarkable reversal of policy here appears as applying to British and American practice. Mr. Humphreys recommends the smaller American companies to manufacture only water gas; whereas he knows that in England only the larger undertakings find an auxiliary water-gas plant advantageous.

Speaking now as a protector of the established order of things in the gas industry, Mr. Humphreys is virtuously indignant at the iniquitous proceedings of the pirates who make raids on other people's preserves, and is aghast at the madness which has plunged the New York City Companies into a mutually ruinous war of rates. In the Capital there is now exhibited the demoralizing spectacle of gas being offered on all hands at one-half the price which the once-united Companies swore before the City and State Governments was insufficient to maintain them in honourable solvency. Let it be stated at once that it is the apparently ineradicable liability of the native American gas industry to these "wild-cat" doings, that bars people in this country from taking serious notice of American gas affairs. Here, the financial, the industrial, the commercial, and the engineering interests of the gas industry are all bound up together. An English gas manager knows that everything he does in his works must affect in the last place the price at which gas can be sold to pay dividends or loan interest. The whole business is open and above-board. Not so in the States, where engineers and managers appear to be puppets in the hands of their "bosses." Nobody knows what the gas magnates are going to do next. This

licence is fatal to the reputation of the industry. It is impossible to determine whether American gas engineering practice is good or bad, in any place or at any time, because it has no rational basis.

This consideration accounts for the small and languid interest that alone attaches to American gas engineering practice, as well as to the American handling of gas supply politics. It is, of course, the affair of the American people who tolerate this go-as-you-please style of gas supply. Nobody else has any right to complain. But all this legislative and commercial looseness of handling so great a matter does not bear out the conventional description of the Americans as a practical people. With the solitary exception of Massachusetts, the State Legislatures make no serious attempt to regularize the gas supply of the country by promising reasonable security where the Gas Companies, as Mr. Humphreys puts it, give their patrons "fair prices, efficient service, and courteous treatment." How to reconcile this reasonable security with adequate pressure in the direction of efficiency, is a sufficiently difficult problem for any community to solve. We do not claim that it has been completely solved in England, or on the European Continent—far otherwise, indeed. But, at least, the Imperial Parliament and the Continental Legislatures have tried. The disappointment in the case of the United States is that they do not try. They have a few *dilettante* writers on the subject, who never effect anything practical; and they have their outbreaks of private gas wars, which never settle any principle. The marvel is that mere technical matters receive the intelligent attention they do at the hands of the excellent American engineers, of whom Mr. Humphreys is so brilliant a representative, while what English people are accustomed to regard as the foundation of all industry—the adequate protection of industrial property—rests on so precarious a base.

The Workmen's Compensation Act and the Case of Main-Layers.

In another column appears a fuller report—taken from the "Law Times"—of the judgment of Judge Stonor in *Bennett v. Aird and Sons*, together with our correspondent's further views upon the probable bearing of this decision on the *status* of men employed in the distribution department of the work of a gas factory. Our correspondent, from whom we have differed on the point, evidently feels exercised at his opinion being called an "off-hand" settlement of the wide general question which he himself raised on the somewhat narrow particular case. We have no wish to quarrel over a term, and certainly did not mean the word "off-hand" to express contempt of the opinion. All that we did desire was to protest against the sweeping generalization of our correspondent, that the decision excludes from the Act "*all men* engaged in laying or repairing mains or service-pipes." These are the exact words; and we think they go beyond the mark. We particularly object to the corollary "that gas companies incur no "liabilities under the Act in respect of the men employed "in the distribution department." Put like this, without qualification, the ruling is a dangerous example of generalizing upon insufficient premises. Judge Stonor had to deal with the difference between what are called in text-books the "mechanical powers," and what the Act meant by "mechanical power." The distinction is a perfectly clear one. The former is a classification of mechanical advantages applicable to any kind of power; the latter is a description of the prime motor. We ventured to agree with Judge Stonor in his use of this distinction, but do not think that the judgment covers the whole ground of gas or even water distribution. Everything depends upon the nature of the accident, which is only as much as to say that every case must be considered upon the facts.

It may be noticed that we never mentioned the subject of gas explosions in this connection; but this was precisely the class of distribution accidents that we had in view in trying to restrict Judge Stonor's decision to the narrow limits of the case. Our correspondent asks whether we should advise the acceptance of responsibility by the gas company for "the explosion of a main." Most certainly. This is perhaps a debateable point; but it is exactly the case which we had in mind in penning the concluding lines of the article last week. It was in this regard that we contemplated the operation of the subtle legal mind as possibly defining a gas-main to be a part of the factory within the meaning of the Act. The gas in the street mains is still the company's property. Read in this light the judgment of the Lord Chancellor in the notorious Nine Elms case ("Journal," Vol. LIV., p. 310). The Lord Chancellor there asked: "How is it [the gas] "supplied? It is supplied by mechanical means." Speaking with all the deference due to the rule that legal precedents require legal minds to interpret them reliably, and therefore without any confidence whatever in the opinion, we incline to the safe view that the legal question of the responsibility of a gas company for what mischief may be accidentally done by their own gas to their own workmen, had better be left an open one. According to the House of Lords, the operation of the distribution of gas is a continuous one, depending upon the exercise of mechanical force which is at the disposal of the supplying company. We repeat, therefore, that he would be a bold man who should generalize with confidence as to where responsibility ends. Our advice is, to give the sufferers the benefit of the doubt, where doubt exists.

Labour Troubles in the Coal Trade.

Coalowners are enjoying a season of exceptionally high prices and full work. The sun is shining upon them as it has not shone for many a day; and they are diligently making hay in the noontide—as gas managers know to their cost. But their sky is by no means cloudless; for they have always the labour question to chasten their enjoyment of prosperous days. The present is certainly a time when owners must view the prospect of a cessation of work with a feeling of bitter disappointment and irritation; but there seems only too good cause to fear that more than a dozen collieries in South Wales, employing something like twenty to thirty thousand miners, will be thrown idle to-morrow. The greater part of the men will have to stop work owing to the dispute (which, writing a month ago, we had every reason to believe had been settled) between the enginemen, stokers, and fitters in the Monmouthshire, Merthyr, and Dowlais districts. These men, it will be remembered, gave in notices to cease work, expiring on the 1st of this month; but eventually they suspended the notices until to-day to permit of further negotiations between their representatives and the owners. The negotiations, which were at one time believed to have led to a settlement by the men accepting concessions from the masters, have, we are sorry to say, up to the time of writing, proved abortive; and unless a basis of agreement is found at the eleventh hour, to-morrow will see some 20,000 miners idle for want of men to work the surface engines.

Upon the merits of the dispute it is difficult for anyone other than an arbitrator with the necessary detailed evidence before him to pronounce judgment; but we gather that the owners have made considerable concessions to the men, who, however, prefer no bread to half a loaf. The details of their demands are complicated. Broadly, they amount to higher wages per day for an eight-hour instead of a twelve-hour shift. The men work seven days a week, as the engines have to be kept running night and day. The Owners' Committee are willing to concede rates higher than the present, but not so high as those demanded; but they only offer to reduce the working hours from 84 to 78 per week by giving a shift off once a fortnight. The representatives of the men and the Owners' Committee were to report to their respective Associations yesterday; but little hope of settlement is held out. It is, however, to be remarked that the Miners' Federation are not supporting the movement—the men belonging to an independent Association. In addition to this dispute, a stoppage of work is also anticipated to-morrow in the Western, or Swansea, districts, where the men have given in notices in order, if possible, to obtain a rise of wages in consideration of their consenting to adopt the sliding-scale system; their employers having recently joined the Coalowners' Association. This Association have announced their intention of supporting the Swansea owners in case work is suspended. The number of men here affected is about 3000. When we add that 1000 men employed at the collieries of Messrs. Glasbrook are already idle, in spite of being ordered by their Federation to resume work and accept the award of the arbitrators, our readers will see there are many crumpled rose-leaves in the South Wales colliery-owner's bed.

The Welsh coalfields, however, are not to be allowed a monopoly of these harassing disputes; for it is announced that the Miners' Federation of Great Britain are girding their loins for battle. The wages of the men connected with the Federation have been steadily advancing until,

on the 1st inst., they were, by an increase of 2½ per cent., brought up to 40 per cent. beyond the 1888 standard. Under the arrangement at present in force, the maximum they can ask for is 45 per cent. above that standard; and it is announced that the Federation are about to advance a claim, based on the present state of trade, for the 5 per cent. which would take them to the maximum. So far as can be ascertained, the employers will strongly oppose such a demand, as being unwarranted. As we have before pointed out, one consideration that must greatly influence the attitude of the employers is the difficulty of ever getting the men to consent to a subsequent reduction of wages when a time of exceptional prosperity like that now being enjoyed gives place to the inevitable succeeding depression. Another fact that will certainly not predispose the coal-owners to look favourab'y upon the demand for higher wages, is the tendency for the amount of work done in a given time to vary inversely with the rate of pay. We believe this to be the experience of many collieries, and particularly at the present time. If the owners cannot see their way to grant, or the men to forego, the claim for the maximum rate of wage, the outlook will indeed be disquieting to coal buyers. They are none too happy as it is.

Statutory Companies Not Exempt from Building Bye-Laws.

A NOTABLE decision of a Divisional Court on an important point of law affecting Gas and Water Companies is that in the case of the *Uckfield Rural District Council v. Crowborough District Water Company*, reported elsewhere. The short point submitted to the Court was whether the Water Company's Special Act exempted them from the bye-laws of the Rural District Council. It was a question of conforming to the building regulations framed by the Local Authority by virtue of section 157 of the Public Health Act, 1875. The Authority complained that the Company did not give notice of their intention to begin building, did not deposit plans and sections, and acted as if they were independent of the supervision of the District Council. It was contended for the Company that they were empowered by their Special Act to construct certain buildings; and that this sanction was sufficient for them. If any building turned out to be a public nuisance, then the Company could be indicted; but, short of this, it was argued that the Local Authority had no right at all to interfere. Their Lordships decided in the strongest terms against the Company. It was put to the Court that, having once received authority from the Legislature to put up a building, the Company might put it up as they pleased. The Court refused to accept this argument. All that the Special Act gave was authority to erect a certain structure in a particular locality. Having secured this power, the Company were in no better condition than a private owner who wished to erect a building on his own property, and who must conform to the local building laws, unless specially exempt. Their Lordships were so strong on the point that they refused to allow leave to appeal further. The effect of this decision cannot be too widely known. It settles a point that has often been in dispute, but has never before been brought to so clear an issue. Incidentally, it may be regarded as still further discounting the value of a Special Act of Parliament; but this cannot be helped. One cannot but sympathize with the view of their powers taken by the Water Company in this instance, because the non-legal mind would naturally think that, where Parliament sanctions the doing of a certain thing, there can be no objection to its being done straightway. It now appears that the sanction of Parliament is to be interpreted with regard to many conditions. Some of these came out in the Hull gasholder case; and now others appear.

The Midland Association Meeting.

THE short meeting which the members of the Midland Association of Gas Managers held in Birmingham last Thursday was packed with interesting matter; but the time allotted to its consideration did not permit of full justice being done to it offhand. There were two papers read, but the discussions were deferred until the next meeting. While, as a general rule, we hold that the postponement of discussions is to be deplored, under the circumstances of the occasion this could not be avoided; and in this particular instance, too, the next meeting is likely to gain in interest and quality more than this one lost in substance. The papers will not suffer; but one of the authors—Mr. George Helps—must brace himself up for a warmer time than he would have had if his paper had been hurriedly taken in hand by the members last Thursday. The subject of his communication was the heating of gas-retorts; and this has been, as the Patent Office records show, a pet study of his for some time past. But Mr. Helps has made a rapid flight, and now announces his acceptance of the most advanced form of gaseous firing. He is of opinion (employing his own words) "that, even in small works, one producer for a number of "beds is the most efficient and economical system for "heating retorts"—horizontal or inclined. This is a clearly stated declaration; and, in making it, Mr. Helps seems to renounce, without reservation of any kind, his own offspring as something altogether inferior. There are well-known engineers in the Midland Association who hold a strong view quite contrary to the newly-adopted one of Mr. Helps; and we shall be disappointed if, at the next meeting, members do not energetically assail or defend (in whichever direction their opinions may lie) the very frank expression of belief as quoted above. In those words is found the debateable point of the paper. The second communication, by Mr. B. W. Smith, of Smethwick, contained much useful information respecting the new inclined retort installation at his works. Of this we were able to speak well when describing it nearly six months since; and we have nothing to add to, or withdraw from, the praise then bestowed. All the members present gladly availed themselves of the opportunity that was given them of inspecting the installation later in the day. The office-bearers for next year were elected at the meeting. Mr. J. Ferguson Bell, of Stafford, passes from the vice-presidency to the chair, and is succeeded in the office he quits by Mr. Thomas Glover, of West Bromwich, who has already achieved an honourable record in the gas-engineering profession.

Financial Tricks of Gas Companies.

ATTENTION is drawn by a correspondent who may well be nameless—because the matter is not a question of personal authority—to a tricky way of issuing new capital to which it is alleged some Gas Companies are now addicted. It is complained that, while applicants are required to make a deposit, and pay in a proportion of the premium offered, with the letter of application, there is no reciprocal obligation to complete the issue of the stock subscribed for before the statutory three months' period of grace. The effect of this is, of course, that the Company have a considerable sum of money in hand for which no interest is payable. It is even alleged that sometimes a much longer delay is allowed to intervene between the receipt of the money from the public and the issue of the stock. It is difficult to believe that anything like sharp practice can be the interpretation of lapses of this kind; because, obviously, the credit of the undertaking is involved in the conduct of its finances according to the spirit as well as the letter of the law. At the same time, it cannot be gainsaid that, in connection with the administration of some Companies, a grasping of the smallest advantage permitted by law has occasionally been exhibited, which accounts for much of the ill-feeling with which the concerns are regarded in their own neighbourhoods. Nor does this reproach attach to Companies solely; for Gas Committees of Corporations are open, in their way, to the same impeachment. The spirit of the small attorney has not departed from the land. On the contrary, there are places where it is rampant at the present hour. The victims of the evil cannot always make their protests heard effectually, and so they prefer to keep silence lest a worse thing befall them; but many bitter complaints of such official practices reach the "JOURNAL" during a year. While the "unctuous righteousness" of the community is being soothed by the Lord Chief Justice's threatened proceedings against illicit commissions, it would be as well for the heads of Companies and trading Corporations to see that equally wrong indirect taxation is never carried on under their own office rules.

Some Experiences of Lord Playfair.

A BIOGRAPHY of Lord Playfair, by Sir Wemyss Reid, is being published by Cassells. Possibly the younger generation of gas managers and chemists are unfamiliar with the name of Professor Lyon Playfair, as he was long known to Fame before Mr. Gladstone made him a peer. Like Bunsen, Playfair was an inspiring teacher. Among his

pupils was James Young, the founder of the Scotch shale oil industry. It was a suggestion of Playfair's that put Young upon the track of this development. Curiously enough, another of Playfair's observations in regard to this subject is a contribution to the old difficulty of Biblical commentators, as to what was the nature of that "salt of "the earth" which, when it had "lost its savour," was only fit to be "trodden under foot of man." Playfair, with all a Scot's literalness, thought this expression must refer to "natural petroleum," because "on losing its volatile "essence it becomes asphalte, which was used for pave-"ments both in Nineveh and Babylon." More to the point, perhaps, as a matter of technical history, is Playfair's statement that the first two paraffin candles made by James Young were exhibited by himself at a lecture delivered at the Royal Institution. "Young kept the "remains of these original candles as a memorial of the "origin of one of the largest of the chemical industries of "modern times." The utilization of the gases of blast-furnaces was suggested by Playfair, in collaboration with Bunsen. It has been already hinted that Playfair, the Chemist, died some time before Lord Playfair was rewarded by a peerage for his services to the State as Chairman of Committees during a stormy time in Parliament. Still, there is much to be learnt from the recorded experiences of the pioneers of what have since that time become chemical industries.

A Lesson in Industrial Economy—The Indigo Industries.

A good many of the assumptions of scholastic political economy would be badly shaken by being tested against the known facts of the coal-gas residuals trade. On the other hand, some of the incidents of this commerce bear out in a remarkable way the general laws of economics. One of these—the rule that competition is good for trade—is supported by what has been going on of late in the indigo market. It is now some years since the successful synthesis of indigo from coal-tar products threatened the natural cultivation of the dye-plant; but the growers had a respite, due to the fact of the artificial pigment being dearer than, and not quite so good as, their own. Still, the appearance of the so-called artificial indigo was a warning to the growers of the plant to look out for themselves; but this warning was contemptuously disregarded. The growing and preparation of the indigo plant went on by the old methods, while the resources of modern chemistry were concentrated upon the improvement and cheapening of its rival. Recently it appeared that the indigo growers had taken the alarm; but, their rivals declared, it was almost too late. German indigo, a coal-tar dye, has almost rewarded the pains and expense lavished upon its production; while the natural dye-stuff remained just as it was—an almost accidental product of one of the rudest and most wasteful of agricultural operations. So far had the matter gone, that "The Times" the other day discussed the Indian indigo cultivation as a dying industry. This conclusion has since been denied. It is admitted that, in the absence of competition, the indigo industry in India has not improved upon the methods of a hundred years ago. A few chemists had looked into the process of preparing the dyes; but they were not encouraged by the planters. Growers, buyers, dealers, all united against anything new. Meanwhile, the world had been going on regardless of them and their prejudices, until one fine day indigo that had not passed through their hands was quoted in the market. Then the old stagers began to put their house in order. They called in the chemists, whom they had previously despised, and told them to improve things generally. Unfortunately, much valuable time had been lost. Nobody knew anything about the *rationale* of indigo production from the plant, which does not, as a matter of fact, contain it as such. Its production is now believed to be a question of microbes; and it is also thought that only about one-third of the dye in the plant is obtained by the traditional methods, and that even of this poor yield 20 per cent. is wasted. Hence there is an ample margin for such a degree of improvement of the natural industry as will enable it to withstand the competition of the artificial dye. There are many "morals" to be drawn from this story, by those who will take the trouble. Gas and coal-tar manufacturers will look on the struggle with impartiality amounting to indifference, as the prosperity or otherwise of the coal-tar colour and drug trade does not seem to strike back to the market for raw material,

WATER AND SANITARY AFFAIRS.

The London County Council will be busy to-day with the Metropolitan Water Question, if the subjects relating thereto standing upon the *agenda* are considered at any length. In the first place, the Water Committee will recommend the Council to renew their efforts to obtain control of the water supply by reintroducing their Bills to sanction the purchase of the undertakings of the eight Companies and the provision of an additional supply of water from Wales; and in the next, to refer the matter to the Parliamentary Committee, with the view to the preparation of the necessary Bills for carrying out this recommendation, and also the Water (Finance) Bill. The report of the Water Committee on the subject of the examination of water, in which, as briefly mentioned last week, they express a wish that the Local Government Board should extend their investigations to a daily examination of the water supplied by all the Companies, will come up for discussion. The recommendation is opposed by Mr. Bond.

The bulky Blue Book in which the President of the Local Government Board presents to Her Majesty, and those of her subjects who are specially concerned therewith, the record of the work of his Department, always furnishes a wide range of subjects for the student of social progress; but for most readers of the "Journal," the section devoted to the Metropolitan Water Supply has the greatest attraction. The last report of the Board, issued a few days ago, which deals with their proceedings in the year 1898-9, possesses for us a somewhat melancholy interest, inasmuch as two of the usual contributors to these annual productions have finished their life-work. For some years we had been accustomed to find regularly reproduced by the Board the full report on the Metropolitan Water Supply for the previous year furnished by Sir Edward Frankland to the Registrar-General, and appearing in his annual summary. This, however, for some unexplained reason, was very much curtailed in last year's report; nothing whatever being said on the subject of the bacterioscopic examination of the water, which had previously been treated at considerable length. This year, as we pointed out a few months ago, the annual summary itself was silent on this important matter; the reference to the Metropolitan Water Supply being restricted to a couple of tables recording the quantities of water supplied and the number of services. In commenting upon what could not but be regarded as an extraordinary mode of dealing with Sir Edward Frankland's report, we remarked that he himself might possibly be withholding it from the summary; but, if not, the conclusion was forced upon us that he was encountering some form of official opposition, and that when the Board's report for 1898-9 made its appearance, one might look in vain for any information about bacteria. This we find to be the case. All we are told is that Sir Edward had, at the request of the associated Water Companies, extended his monthly examinations to the chemical, physical, and bacterioscopic condition of the raw river water at the several intakes, as well as to the bacteriology of the water issuing from the filters of each Company, and before it is pumped into the mains; but no results are given. The Board evidently did not attach much importance to these investigations; and now the distinguished Chemist who conducted them has passed away. The other contributor to these reports whose name will cease to appear therein is Major-General Scott, the Official Water Examiner under the Metropolis Water Act, 1871, whose death was recorded last week.

It is impossible to deal here in anything like detail with the last report of the late Water Examiner. But it may nevertheless be interesting to compare it, in certain particulars, with the first he presented to the Local Government Board, dealing with the year 1887. It is gratifying that both he and Dr. Frankland were at that time in a position to testify to the success with which the Water Companies had coped with the increasingly difficult task of supplying a huge and growing population with water from an area constantly exposed to fresh pollution; for the water from the Thames and Lea contained a smaller average amount of organic impurity than in any year since the system of analysis then in use had been adopted. This was, of course, due to the efforts of the Companies to improve their storage and filtration plant; and in his last report General Scott has placed on record the fact that the Companies deriving their supply from the rivers are now

actively engaged in constructing additional reservoirs, or in making arrangements to do so. He says it is necessary for the proper treatment of the water that storage for thirty days' supply should be provided by each of the Companies. If so, no impediments should be placed in their way when they apply to Parliament for powers to enable them to attain this ideal, which, as a matter of fact, the East London Company, with their 31 days' storage, have already surpassed. When General Scott entered upon his duties in succession to the late Sir Francis Bolton, the average daily supply of water in the Metropolis was 157,502,394 gallons, to an average population of 5,002,079, or at the rate of 31·48 gallons per head; while last year it was 204,053,955 gallons to a population of 5,814,219—representing a daily consumption of 35·09 gallons per head. Of the total bulk of water delivered in 1887—59,787,866,538 gallons—53·78 per cent. was drawn from the Thames, and 33·29 per cent. from the Lea; whereas of the 74,479,693,644 gallons distributed last year, 57·33 per cent. came from the former, and only 21·65 per cent. from the latter source—showing that more water is being drawn from springs and wells. Probably the most striking contrast between the two years now being dealt with is shown in the great extension of the constant service, which was last year furnished to about 92 per cent. of the total number of houses supplied, as compared with 51 per cent. in 1887. So much for the attention paid by the Companies to the ordinary requirements of the consumers. For fire-extinction and other purposes, in the last named year there were available 10,544 hydrants; whereas at the close of the past year the number was 36,722. The total length of mains in use at that date was 5322 miles, of which about 95 miles were laid during the year.

As we are now on the threshold of November, movements are being made in various directions to prepare for the parliamentary work of next session in regard to water supply; and there is every indication that some steps will be taken to obtain for Local Authorities definite powers over the sources of water in their districts. As the law now stands, they cannot prevent outside bodies from taking water which may really be required for local consumption, or interfere to stop works which manifestly affect to a very serious extent springs which should be available for furnishing a town's supply. This matter was considered at the annual meeting of the County Councils Association last month, with the result that a circular was pretty freely distributed pointing out the necessity for some immediate action with the view to protecting the rights of localities in their natural water supplies. A Committee of the Association was appointed, with Lord Belper as Chairman, to at once consider and report upon the subject; and at the recent meeting of the Association of Municipal Corporations, it was decided that a Committee should co-operate with them. Suggestions have been invited as to the best method of dealing with the matter; and we anticipate some difficulty in formulating such amendments of the existing law as will be satisfactory alike to Local Authorities and property-owners. Certainly, in the case of mining operations, there is at times a perfectly reckless waste of water through pumping. An instance of this has lately been recorded in the Midlands. The Water Committee of a Corporation having control of the water supply were anxious to provide duplicate pumping machinery and increase the storage capacity of their reservoirs; and they intended recommending the Town Council to carry out the works. But the supply of water was jeopardized, it is reported, by the pumping to waste, by a colliery company in the locality, of millions of gallons of water daily taken from the underground sources; and as the Committee had reasons for believing that this was to be continued in perpetuity, they came to the conclusion that it would be unwise to incur a large expenditure for additional plant and permanent works, if the water with which they would have to deal was likely to be diverted into other channels. It appears that this is by no means a solitary instance of the kind; and if such a condition of things could be remedied by different methods of working, and the water made available for ordinary consumption, it would seem right that the Local Authority should have some power to step in and have it done. But when it comes to a question of interfering with a landowner's right to dispose of the water upon his estate, the matter wears a more serious aspect. However, the two Committees should be able to prepare some scheme which could be embodied in a Bill.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 1071.)

Most of the markets in the Stock Exchange had a good time last week; but it did not come all at once. The tendency at the opening was decidedly cautious; and the public, disappointed in its greediness for a fresh victory every day, seemed to hang back a bit. The general course then became one of small ups and downs, with nothing very pronounced either way, but sensitive and watchful to a degree. Meanwhile a side influence was setting in from the Money Market, the increasing ease of which was irresistible; and at last things sailed along merrily before a fair wind. Prices pretty well everywhere closed at a nice advance over their opening figures. This sort of thing seems likely to continue; for many people are firmly impressed with the belief that, when our force in South Africa is strong enough to strike the decisive blow, there will be a big boom in prices, and they are all anxious to get in first. The Money Market has been quite remarkable for its ease. Overabundance of supply has made loans very cheap, and discount rates have dropped considerably. The aggregate of business done in the Gas Market again fails to bulk up to anything like a moderate figure. Day after day things were almost as "list-"less as they well could be; and movements in value were very few indeed. And they, too, were very irregular; but the upward rises were much more important than the backward falls. Conspicuous in front was Gaslight ordinary, which at once improved upon its firm tone at the close of the previous week. Opening at 105, it steadily pushed on to 106½, at which the closing bargain was marked. Among the secured issues, the preference was also in good favour, and pushed up a point. South Metropolitan was moderately active and firm; but it could not quite score a rise. In Commercials, there was nothing worth mentioning. Very little was done in the Suburban and Provincial group; but Brighton new was put down, though no business was marked in it. The Continental Companies were quite quiet and unchanged. In the remoter world, the only noticeable feature was the flatness of Monte Video, which had a big fall. Business in the Water Companies was more extensive, becoming almost animated on some days. Southwark was the chief focus of attention; and it had a further advance.

The daily operations were: Business in Gas was only moderate on Monday; but prices were very good. Gaslight ordinary and preference rose 1 each. Tuesday was a busy day in Water, but very quiet in Gas. Brighton new fell 3. Wednesday was as quiet as any day in the week; and quotations did not vary. Thursday's tendency was generally firm; but Monte Video commenced its downward course, with a fall of ¼. In Water, Southwark advanced 1. Friday, though quiet, was noticeable for the firmness of Gaslight ordinary, which rose 1. Monte Video fell ½. Saturday's prices were steady; but Monte Video fell 1 more. In Water, Southwark rose 2.

ELECTRIC LIGHTING MEMORANDA.

The Case of Shoreditch—Another Hunt for the Profits—Antagonism of Labour Politics and Electrical Enterprise.

The much-discussed Shoreditch electricity-generation *cum* dust-destruction installation is the subject of analytical investigation in the current number of the "Electrician." The accounts of the last municipal year's working of this well-advertised combination are not easy of comprehension. The chief difficulty arises when it is attempted to ascertain whether it is the dust destruction that helps the electricity works, or *vice versâ*. We have already borrowed the spectacles of our contemporary the "Engineer" in order to see this thing from an unprejudiced point of view. It is fair to state that Mr. Alliott has since written to our contemporary to explain the rather large coal consumption at the Shoreditch electricity works. He states that this is partly due to the suspension of dust-delivery and burning between Saturday and Monday, and partly to the thermal storage part of the scheme not having been carried out. Consequently, the production of steam by the dust-destruction plant bears no sort of adjustment to the requirements of the electric lighting station. Still, Mr. Alliott holds that the Shoreditch combination does show a gain of £1200 a year. Another correspondent maintains that the idea of utilizing town's refuse at a profit is illusory. He puts it in the same category with the exploded systems of disposing of sewage at a profit. We can all recall dozens of these schemes, all promising to cure river pollution at a profit to the shareholders. Time has proved that sewage is not worth having; and we now hand it over to the microbe, paying heavily for the incidental expenses. So it is, runs the argument, with dust-bin refuse. This has got to be disposed of somehow; but we must not be led away to regard it as a source of gain because it can be burnt instead of carted or barged away to a tip. A tip, even, may return a revenue sometimes; but it cannot therefore be regarded as an asset of permanent value.

This matter is not easy to put upon the proper basis. It is

very easy, however, to show "profits" on paper, when arbitrary charges and credits are dodged about in order to uphold a case. As this writer puts it, the general practice is to value the steam produced by the destructor and used, say, by an electric lighting station at what it would cost if coal had been the fuel instead of rubbish. The writer lays it down that this is wrong, and has nothing to do with the actual money passing through the hands of the town treasurer. The cost of the steam produced by the refuse is the actual expenditure of collecting and burning this rubbish. In no other way has the account an actual cash basis. It is to be noticed that Mr. Alliott does precisely what this critic condemns. This may be an engineering way of looking at the subject; but it is not a right-minded auditor's way. Such an officer would say that a local authority has no concern with the calculated price of what it never bought. Accepting the force of this objection, we are fain to confess that we are completely in the dark as regards the true financial results of the Shoreditch performance. The "Electrician" is greatly impressed with the rapid growth of the output of the electricity supply station for the year, but finds a reason for this in the remarkably low average revenue of 3·2d. per unit. This it regards as unjustifiably low, and questions the financial soundness of the tariff. Then, as regards the working expenses, there is nothing charged against the electric lighting works for steam supplied by the dust destructors. This omission is fatal to the reliability of the whole set of accounts. The mere question of what ought fairly to be so charged opens up such a vista of arbitrary charges, allowances, and credits, that nobody could say whither the investigation would lead. That it would exhibit the Shoreditch enterprise as solvent we take the liberty of doubting.

It is complained that the Labour interest in British municipalities is on the whole opposed to electrical enterprises. One would scarcely be prepared, on general grounds, for this allegation; yet there is probably something in it, if one may judge from recent incidents. The subject is discussed in the current issue of the "Electrical Review," which confesses to entertaining some misgivings as to the real soundness of the principle of making electricity supply a "communal enterprise." This suspicion strikes one as being rather belated; but let it pass at that. Our electrical contemporary draws attention to what it calls the "somewhat curious fact" that, until the advent of electricity supply, the doctrine and practice of municipalization "had not taken very firm root." It is admitted that there were such things as Corporation gas and water works; but the remarkable comment upon these enterprises is that "the success in the working of these had not been very striking." Municipalization, that is to say, only became a craze when electricity supply came into being. Granting that this is true, it may be argued that it is only a coincidence. When was it that "Progressivism" became a recognized movement in municipal politics? Just about the period when, the formation of electric light companies having come to a stop for want of more suitable openings, the touting electricians had the happy idea of hunting up orders among local authorities. What more natural than that these wide-awake gentlemen should lay themselves out to captivate the "advanced" division of municipal busybodies, wherever they could find them? For some time, our perfervid Progressives, who usually were merely feather-brained young theorists, had no rallying principle to distinguish them from the old fogies who only wished to economize the rates and do the public work in the cheapest way. Aided and abetted by a few Socialists, professional Trade Unionists, and journalists of the Board School brand, this new Party in municipal politics evolved the grand idea of municipalism for everything—meaning the doing of everything by the local authority for itself. Electricity supply happened to be in the air just at that period—the Progressives pounced on it as a test question. All Municipalities must do their own electric lighting—that became the Shibboleth. All who took a different view were genially denounced in the newspapers of the party as traitors, corrupt persons, dunderheads, and everything that was stupid and vile. So the movement went on, and many towns got their electric lighting works—to the sorrow of the ratepayers. Now it is complained that the Labour wing of the Progressive army does not get on very well with the electrical branch. The "Electrical Review" declares that "there is very little doubt that the labour element in municipal life is strongly antagonistic to electrical interests." If this is a correct description of the state of affairs, the Progressive party seem to be already breaking up in some places.

The International Gas Congress for 1900.—The Italian Society of Gas Managers have just signified their acceptance of the proposal made by the Société Technique du Gaz to meet in international congress next year in Paris. The languages to be allowed at the congress, besides French, will be English, German, and Italian. A provisional programme of subjects to be discussed has been issued. Among other topics suggested are inquiries into the principal causes of incandescent gas lighting, the photometry of incandescent burners, improvements in the working of inclined retorts, and the comparison thereof with horizontal settings and stoking machinery. Then there is the ever-present question of obstructions through naphthalene deposits; the means employed for interesting stokers in increasing the make of gas and in economizing fuel; and, lastly, the technical education of foremen, plumbers, and other gas workers.

THE BLUE-BOOK OF THE METROPOLIS GAS (POWERS OF CHARGE) COMMITTEE.

THIRD NOTICE.

THE last instalment of our story of the proceedings of the Powers of Charge Committee, as revealed in the Blue-Book, stopped on the brink of the settlement of 1875-76, when the sliding-scale of selling price and dividend superseded the old arrangement of maximum price and maximum dividend. The important point here, as Mr. Haward strove to make out, was that the maximum price was that at which, with the exercise of due care and management, the London Companies would have a reasonable prospect of making the maximum 10 per cent. dividend. This condition implied periodical, or occasional, revisions of the maximum price; and it was the breakdown of the arrangements for this revision that upset the whole thing. Theoretically, the Companies accepted the principle. Practically, they kept so much in hand, in order to make their maximum dividend quite safe, that the public authorities remained dissatisfied. The outcome of this discontent was the tabling by the Metropolitan Board of Works, in 1874, of three Bills proposing to deal with the gas question in as many different ways—by purchase, by a competing supply, or by regulation.

We here pause to explain—for the instruction mainly of American students who are yet in the stage of development of gas politics which then prevailed in London—that Parliament will not entertain any Bill proposing alternative means of attaining a desired end. Every Bill must disclose a particular and definite scheme, which it is for Parliament to accept or reject on the merits. Thus, in theory, Parliament never advises, but only decides. In practice, however, by promoting concurrent or successive Bills, it is possible to ascertain the mind of Parliament. In the case in point, Parliament at that day was averse both to the introduction of a new competing supply, and to the purchase of the existing Companies. The Bills devoted to these remedies were dropped; and all the powers of the State and of London local government were addressed to the remaining problem of regulation. While this question was being bandied about, the Board of Trade enunciated the potent opinion that the principle of a sliding-scale, in which the price should vary inversely as the dividend, might prove a more effectual mode of securing "due care and economy" than the then existing system of official revision. The Department doubted whether any Government Department, or any official Commissioners, however zealous and competent, could dictate to a trading company the terms and conditions of manufacture on which they could make the greatest amount of profit, and fix the price of their commodity accordingly. The text of this pregnant communication appears in the answer to Question 167. The Department at that time had no other idea regarding the sliding-scale besides that of offering it as an improvement upon the existing machinery for securing due care and economy of administration. There was to be "no limit" to the range of price and dividend, up or down. The point was warmly contested between the Board of Trade and the Metropolitan Board of Works; the latter objecting very strongly to the proposal that, as Mr. Haward put it, "a monopolist company should under any circumstances have more than 10 per cent." Eventually, as everybody knows, the more liberal view of the Board of Trade prevailed; and, for the first time in the history of the British gas industry, the prospect of a higher dividend than 10 per cent. was opened up. Reference to Lord Farrer's Memorandum of 1876 shows that the Government and Parliament of the day were strongly advised by this convinced Free Trader to allow the Companies their share of the benefit they might be expected to realize when given "the same motives as actuate ordinary traders for making their concern profitable by economy." Lord Farrer also thought that cheap gas—say, at 2s. 5d. per 1000 cubic feet—would satisfy the consumers, notwithstanding that it would carry an increased dividend of 14 per cent. He remarked: "At such a price there is not likely to be discontent or agitation;" and the forecast has been fulfilled. Mr. Haward returned to the same line of argument in his answer to Question 177, which began with something quite different.

This is one of the special difficulties in the way of gathering the import of evidence given in an inquiry of this character. Witnesses constantly branch out into all sorts of statements which, although they may be pertinent to the inquiry, certainly do not arise out of the immediate question. In this instance, Mr. Haward was merely asked as to the independence of the South Metropolitan Company; and having lightly disposed of the query, he seized the opportunity for making a speech on the sliding-scale, its intention and operation. In the very excellent Index and Digest of Evidence to the report, separately published since the appearance of the Blue-Book, this testimony of Mr. Haward has not been overlooked. Mr. Haward is here credited with stating the "general result that the sliding-scale leaves the consumers at the mercy of the Companies as to prices." It might be remarked that this, although otherwise expressed, was the object of the sliding-scale. The Board of Trade recognized in 1876 that the fixing of the price of gas had better be left with the Companies. Then, why give the same operation an evil aspect by saying that the price of gas is "at the mercy" of a

sliding-scale Company? Are not "at the mercy" and "in the discretion" different modes of expressing the same idea?

There are notoriously at least two sides to every subject; and the sliding-scale of gas prices and dividends has several aspects. The particular view to which Mr. Haward drew the attention of the Committee was, roughly, that of the different bearing of the sliding-scale on shareholders and consumers according as it happens to be making for cheaper or dearer gas. Assuming the sliding-scale to start with gas at 3s. 9d. per 1000 cubic feet, and a corresponding 10 per cent. dividend, we have here a condition of affairs which is, *ex hyphothesi*, satisfactory to the shareholders, but not to the consumers. Those who originally fixed the relative proportions of the sliding-scale, so adjusted it that the participation of consumers and shareholders in any realizable economy should be as 4 to 1. This was an inducement to the Companies to drop the price considerably, as quickly as possible, in order that the shareholders should reap a tangible recompense for relinquishing the safeguard of the maximum dividend. They were able to do this, because the old maximum prices in every case gave them something "in hand;" so that when the old maximum became the new initial price, there was something to give away immediately. So long as the selling prices continued to fall, everybody was content—the public at getting cheaper gas, the shareholders with their higher dividends, and the governing authorities with the result of their efforts in the way of regulation. After a time, however, the balance found its level, as all sliding-scales are bound to do. In London, unfortunately, there were two very different levels, if not three. When the time arrived that a matter of 1d. per 1000 cubic feet on the price of gas became critical, the old 10 per cent. maximum dividends had long disappeared. As Mr. Haward put it to the Committee: "The South Metropolitan Company, with their gas at 2s. 2d., are entitled to divide 14 per cent. The Gaslight and Coke Company, with their gas at 3s., are entitled to divide 12¼; and the Commercial Gas Company, with their gas at 2s. 6d., are entitled to divide 13¾." The institution of the sliding-scale, that is to say, has proved absolutely ineffective for securing uniform gas prices or dividends in London. The original statutory maximum dividend of 10 per cent., which was at least uniform—although it was supposed to be attainable only with different selling prices—had been sacrificed; while uniformity of price remained as far off as ever.

Mr. Haward's case was that this failure to level-down prices is due to the increase of dividend. When the condition of equilibrium of price and dividend was attained, in the case of the Gaslight and Coke Company, the original 10 per cent. statutory maximum dividend had become superseded by a customary 12½ per cent. dividend, or thereabouts. This happy condition of things, for the shareholders, had been arrived at by successive reductions in the price of gas. True, the reductions amounted to four times the amount needed for the extra dividend; but inasmuch as the dividend was always going up with the reduction of price, the shareholders can scarcely be said with truth to have felt the latter part of the operation. At last the boot came to be put upon the other leg. The fourfold proportion between price of gas and amount of dividend forthwith took an uglier aspect. For every penny of dividend the shareholders were asked to relinquish (above 12 per cent.), the consumers were required to pay fourpence. Then, naturally, trouble arose. Everything that has happened since the balance began to swing the other way, in the case of the Gaslight and Coke Company, has justified the wisdom of those other administrators of the sliding-scale who have resolutely set their faces against making reductions of price that cannot be maintained (with exception, of course, for temporary influences), and have abstained from helping the proprietors to the uttermost farthing of declarable dividend. The very inequality of the proportions into which the disposable surplus profit is allotted as between consumers and shareholders—four or five to one—amounts to a "danger signal" when the irreducible minimum of charge is in sight.

Those who read the Blue-Book carefully, will be struck with the tenacity of Mr. Haward—doubtless acting on instructions—in returning again and again to the question of the expediency of the sliding-scale in principle and in practice. As to the initial prices of 3s. 9d. and 3s. 6d., witness drew attention to the circumstance that these dated back to the coal famine years culminating in 1874, when gas coal cost more than 20s. per ton in London. He raised the novel point that, whereas these initial prices might have been fair enough if the sliding-scale had only been made to operate in one way, as contemplated by the Metropolitan Board of Works, they were too high under the actual conditions.

Still, after all, it was no part of the case of the London County Council to make the sliding-scale out a failure, nor to argue for the reversion to the system of revision. All that Mr. Haward contended for in this connection was that the whole of the reductions of price made since 1875-76 have not been in consequence of the sliding-scale. That is quite reasonable, or there would be no cheap gas in Sheffield to-day. But a very strong point arose in the course of Mr. Haward's answer to Question 199—that the shareholders' interest in the profits of a sliding-scale and auction-clause gas company is less than it was when the system was introduced. What with the consumers' portion and the debenture interest, the nominal proprietor has not the interest in the gross profits that he had. This, said Mr. Haward, "has the result that the sliding scale becomes a less powerful incentive to the companies; and one can quite conceive a position of affairs in which the shareholders of a company really become preference shareholders in the undertaking, and the consumers are really the ordinary shareholders." In this eventuality, the status of the directorate would become the subject of question. Administration of an undertaking in the interest of preference shareholders is not ordinarily looked upon with favour.

After disposing of this part of the case, Mr. Haward proceeded to deal with the subject of the amalgamation of the Metropolitan gas undertakings. He developed the thesis that, "in consequence of the amalgamations, the present position of affairs has largely come about;" this process as carried out by the Gaslight and Coke Company not having been "advantageous to the consumers." This must be reserved for our next article.

MUNICIPAL CORPORATIONS (OMNIBUS) ACTS FOR 1899.

HAVING concluded our summary of the Gas and Water Acts of last session, we find it necessary to record in another category the Local Authorities' "Omnibus" Acts for the year, because the practice is growing of slipping various gas, water, and electricity supply clauses into these Acts; and unless these are carefully gone through, such alterations of the law may be overlooked. The Acts that follow are taken in alphabetical order; and we notice only the matters with which "JOURNAL" readers are more particularly concerned.

The Ayr Burgh Act contains provisions sanctioning the addition to the town water-works of a pumping-station in the parish of Dalrymple, and a service reservoir at Knockjarder. These works are to be completed within ten years. Statutory powers, dating from 1885, for raising the level of the water in Loch Finlas, are revived. The Corporation are empowered to borrow £100,000 on the security of the Common Good. The sum of £20,000 is to be borrowed for water-works purposes, repayable in sixty years. The Corporation may provide electric light fittings for consumers; charging for the use thereof 1d. per unit, with a minimum of 1s. per annum for every 8-candle lamp supplied. The Corporation are, however, forbidden to manufacture such fittings.

The Belfast Corporation Act provides that any differences between the Corporation as tramway-owners and any gas or water or other company or body, shall be settled by a Referee to be appointed by the Commissioners of Public Works, on the application of either party. The Donegall Road Bridge over the Great Northern Railway (Ireland) is to be taken down, and a new bridge made in place of it. Space is to be reserved in the new structure for a 15-inch water-main to be laid and maintained by the Water Commissioners. Power is taken to alter the position of gas-pipes. An additional gas loan of £100,000 is authorized, repayable in fifty years. Sanction is given for the establishment of a provident fund for Corporation employees; and the heads of a scheme of the kind are formulated. The contribution of the Corporation to the fund is to be equal to those of the contributing members; and the Corporation are to at once make good any inadequacy of the fund for the purposes intended.

The Birmingham Corporation Act contains clauses authorizing the transfer to the Corporation of the undertaking of the Birmingham Electric Supply Company, Limited. The capital of the Company is £200,000 in £5 shares, fully paid, and commanding a market price of £10 10s. per share at the date of the agreement for sale. There is no mortgage debt. The Corporation are bound by their Act of 1883 to obtain the consent of the ratepayers to transactions of this kind; which was duly done. The consideration for the sale of the undertaking is £420,000 in cash, or in Birmingham Corporation 2½ per cent. stock. In addition to this amount, the Corporation are to make up the dividend for the years 1898 and 1899 to 6 per cent. per annum. All the Company's debts are to be paid by the Corporation; and £1200 is to be paid to the Solicitors as costs of the transfer. The Company's officers, including the Managing Director, are to be taken over. The Corporation may raise £500,000 for these purposes.

The Blackpool Improvement Act empowers the Corporation to supply electrical energy for tramway traction; and to accept a transfer of the Electric Lighting Order of any adjacent local authority. A clause permits the Corporation to refuse to supply gas or electrical energy to any person whose payments for the supply of either gas or electrical energy is (*sic*) for the time being in arrear, whether such payments be due to the Corporation in respect of a supply to the same or other premises.

The Bootle Corporation Act provides that where any trees or shrubs overhang the street so as to obstruct the light from a public lamp, the owner may be required to lop the growth, or the Corporation may do the work at the owners' expense, being careful not to do any unnecessary damage. The Corporation may accept transfer of the electric lighting powers of adjacent authorities; and may supply electrical energy for tramway purposes. Electrical fittings may be supplied and dealt in, but not manufactured, by the Corporation. The annual statement of the electric lighting accounts is to be made up to March 31 of each year. The Corporation have power to establish a Superannuation or Pension Fund for their employees, on the basis of equal contributions. It is provided that before any scheme

of the kind comes into operation, it shall be reported upon by an actuary approved by a Secretary of State, and be subject to similar revision quinquennially. The Corporation may contract with any life assurance society for carrying out the provisions of this section. Gratuities of not exceeding a year's pay may be granted to Corporation employees under certain conditions.

By the Bradford Tramways and Improvement Act, power is taken to alter the position of gas and water pipes in connection with the execution of authorized street works. The Corporation may supply, but not manufacture, electric motors and fittings.

The Bury Corporation Act substitutes for the various periods of repayment of existing gas loans a uniform period of 22 years from March 31 last. The rights of mortgagees are protected by making the acceptance of premature repayment optional. The Act of 1885, as to the issue of Corporation stock, is amended to permit the issue of redeemable stock. Demands under £50 are to be recoverable in the County Court. A schedule gives the gas-works capital account at March 31 last.

The Darwen Corporation Act contains a part relating to water supply. The construction of a new junction pipe line is authorized. Certain lands are to be taken for the protection of the Corporation gathering grounds. Clauses are inserted enabling the Corporation to supply fittings, and for the regulation of meter supplies. The Corporation may supply electric light and power fittings and apparatus. Overhead wires are forbidden. Discount at the rate of 5 per cent. is allowable on electric lighting and power accounts. The electricity supply business carried on by Thomas Tootall is acquired by the Corporation on terms set out in a scheduled agreement. The sum of £37,787 is required for water-works purposes; £35,000 for gas-works purposes; and £6000 for electric lighting. Notice of intended gas-meter connections or disconnections is to be given to the Gas Engineer. Warning of the effect of this enactment is to be contained in the rental demand notes. Appeals against Corporation orders under the Act lie to the next practicable Court of Quarter Sessions.

The London County Council (General Powers) Act extends the provisions of the Subways Act, 1893, to certain Strand and Southwark Street widening and improvement works; and makes the Act apply to the London Hydraulic Power Company, who are to be deemed to be a Water Company within the meaning of the Act.

The Manchester Corporation (General Powers) Act empowers the Corporation to light private streets, including yards and entries; these powers being in addition to, and not in derogation of, any other power to light streets now vested in the Corporation. The Corporation may supply electrical fittings; and accept transfer of Electric Lighting Orders from neighbouring authorities. The Corporation are to be allowed to insure their own property against fire, by the payment of average premiums until the sum to the credit of the fund amounts to £50,000. Arrangements are to be made for the purchase and extinction of Corporation irredeemable stock.

The Nottingham Corporation Act authorizes the construction of additional water-works, comprising enlargements of the existing Red Hill and Greasley reservoirs, and certain pipe-lines, to be completed within seven years. Power is taken to supply electric fittings. The sum of £144,000 is to be raised for water-works purposes, repayable in fifty years.

The Salford Corporation Act relates mainly to tramways. The Manchester Corporation water-mains are to be protected. A curious provision is made for the protection from personal liability of any member, officer, or clerk of the Corporation for Acts done under the direction of the Council. The clause (103) is as follows: "No matter or thing done or contract entered into by the Corporation or the Council nor any matter or thing done by the Town Clerk or by any member officer or clerk of the Corporation or any person whomsoever acting under the direction of the Council shall if the matter or thing were done or the contract were entered into *bonâ fide* for the purpose of executing this Act subject them or any of them personally to any action, liability, claim, or demand whatsoever, and any expense incurred by the Corporation or Council or Town Clerk, member, officer, clerk, or person acting as last aforesaid shall be borne and repaid out of any of the funds at the disposal of the Corporation."

The Wakefield Corporation Act extends the period for the completion of certain water-works authorized by an Act of 1889. The provisions of the Public Health Acts are applied to the water-works of the Corporation. The collection of the rates is simplified.

The Warrington Corporation Act sanctions the construction of additional water-works, comprising wells and pumping stations and storage reservoirs. Water-mains must only cross the River Mersey by Warrington Bridge. The works are to be completed within seven years. Various interests are protected. Provision is made in the usual terms for meter supplies. The Corporation may make bye-laws with respect to the size of service and other gas-pipes and fittings. A Corporation thrift fund for employees may be established by resolution, on the basis of equal contributions; subject to actuarial approval. The sum of £147,000 is to be borrowed for water-works purposes, repayable in fifty years. The Corporation finances are to be revised, with a view to the consolidation of loans. Paid auditors of the Corporation accounts may be appointed.

The Whitehaven Corporation Act revives the powers of an Act of 1885 for the construction of a weir on the River Ellen. The Corporation may take the waters of Ennerdale Lake, subject to payment to the owners of the property. The works are to be completed within five years. Water may be supplied by meter for all purposes. The electricity supply limits are extended to the whole of the borough. The sum of £15,000 is to be borrowed for water-works purposes. Surplus water profits are to go to the district fund.

The Wolverhampton Corporation Act empowers the Corporation to supply electrical energy for tramway traction. Electrical fittings may be supplied. Ten per cent. discount may be allowed on charges for electrical energy. A clause permits the South Staffordshire Water-Works Company to supply by consent the Coseley and Sedgley districts. The Corporation finances are re-organized.

The Workington Corporation Act extends the limits of water supply to the enlarged borough, and sanctions the construction of aditional water-works for taking the water of the River Cocker. Compensation water is to be discharged at the rate of 2 million gallons per day. Numerous interests are protected. The rate for domestic supplies is 10 per cent. Metered supplies are provided for. A transfer of the Cockermouth shares of the undertaking of the Joint Committee of Cockermouth, Workington, and Whitehaven is sanctioned, on stated conditions. The sum of £95,000 is required for water-works purposes.

COMMERCIAL AND TECHNICAL EDUCATION IN GERMANY.

THE proceedings at the recent festival at Charlottenburg may be said to mark the Apotheosis of Technical Education. The occasion was the celebration of the centenary of the foundation of the local Technical College. The festival began on Wednesday, the 18th inst., but it was on the following Friday that the most interesting ceremonies were held. In the morning, newly-erected statues to Alfred Krupp and Werner von Siemens were unveiled before a large gathering of distinguished guests. Subsequently, a great meeting was held, at which the Emperor and Empress, the Imperial Princes, and several Prussian Ministers were present; and the Minister of Education, Dr. Studt, delivered an address, in the course of which he read two Royal Edicts conferring upon the Rector of the college the title of "His Magnificence," and upon the Prussian Technical Colleges generally the privilege of granting to their successful students the degrees of "Engineer by Diploma," and "Doctor of Engineering." The Emperor afterwards spoke, and declared that the technical colleges could now claim equality with the universities—the highest seats of culture in Germany; and that, so long as the example set by Krupp and Siemens was followed, German scientific industry would hold its own, with honour, in the competition of the nations. As showing their appreciation of the fact that fine titles alone do not make fine engineers, representatives of the leading German industries handed over to the college on the following day a scholarship fund of 1,500,000 marks; while the city of Berlin and the township of Charlottenburg together contributed 120,000 marks for the establishment of travelling scholarships.

Well might Mr. Marshall, in his presidential address to the Institution of Gas Engineers last spring, speak of our own country, together with France and the United States, as laboriously trying to achieve to the standard of education to be found in Germany. There, everyone, from the Emperor downwards, recognizes to the full the value of thorough and high-class education, and is zealous in its promotion. Here, we have scarcely passed the point of overcoming the old-fashioned prejudice against universal enlightenment. We are making progress, it is true; and the "JOURNAL" has gladly recognized the fact. But when one compares the attitude of public opinion towards the subject in England with the enthusiasm, working to such practical expression, evidenced by the Charlottenburg festival in Germany, it is possible to realize more vividly than ever the very large amount of lee-way England has yet to make up.

As bearing upon this enthusiasm for education, and its visible results upon commercial competition, there is an interesting article in the "Fortnightly Review" for September by Mr. J. J. Findlay, upon "The Genesis of the German Clerk." The writer introduces his subject by remarking that, "thirty years ago, we rejoiced in the competition of goods; we boasted that England could hold her own anywhere and with anyone, either in the manufacture of wares, or in their exchange. To-day, however, we are confronted with another form of competition—the competition of men with intellect and will adapted to fight the battle. . . . Our opponent in this new war is the German clerk. He assumes many forms, and plays many parts; but in one and all of these, he steadily makes his way . . . against his English rival." How, then, is this valuable article produced? By a system of education, says Mr. Findlay, not originated to produce the German clerk, but having its birth in the real love of learning, of culture and books and intellectual intercourse, to be found everywhere among the German people. "Your typical German is genuinely interested in learning all that he can about foreign nations, not only because he may profit thereby in pocket, but because he likes to learn things. Everyone who has lived in Germany must have been struck by this general feature of the people, in contrast to ourselves. . . . The ordinary middle-class parent in Germany knows more about the real nature of education, and of the conditions which will make schooling

successful, than our English Cabinet Ministers. But they possess this knowledge, not because they have 'got up' the subject, but because they have grown up with it, as part of the life of their city and country, all through the century."

The fact that the German system of education is the secondary, not the primary, originating cause of the superiority of the German trader and engineer, is not a very encouraging consideration for those who desire to produce similar men by similar means in England. But it is necessary that it should be carefully borne in mind. There must be a demand for and a love of learning on the part of the student, or all the institutions in the world will be barren of fruit. It lies, then, with educational reformers to awaken public opinion to this fact, and with parents and employers to do their utmost to implant and foster a zeal for knowledge in the minds of the rising generations. It is an old truism that a man can lead his horse to the water but cannot make him drink. But he can at least provide the water, and lead the horse to it. The wells of good secondary education are none too plentiful, nor are the paths thereto as easy of access and of pursuit as they well might be.

RECENT PUBLICATIONS.

The Government of London under the London Government Act, 1899. By J. Renwick Seager. (P. S. King and Son.)

The passing of the London Government Act last session has naturally—and necessarily—been followed by the publication of several explanatory manuals. We say "necessarily," because the Act is honeycombed with references to other statutes; and it is a consequence of the system of legislation by reference that every Act of importance drawn upon these lines calls for the publication of a handbook containing an explanation, if not the actual wording, of the sections of the Acts to which reference is made intercalated with the text of the measure itself. Mr. Seager's book, not being intended for the use of lawyers but of the general public, gives the substances of the provisions of other Acts quoted, and not the actual language. Mr. Seager has acquired, in his work on the London County Council, and as a political organizer of many years' standing, a knowledge of the working of London government both extensive and peculiar; and this knowledge has enabled him to elucidate with considerable success the meaning and effect of a measure of some length dealing with a complicated subject.

The most "popular" portion of his book is undoubtedly the introduction, in which he gives a brief but interesting sketch of the municipal history of London since 1835, when the Municipal Corporation Act was passed, leaving the government of the Metropolis unreformed. As Mr. Seager truly says, the government of London up to the passing of the Metropolis Management Act of 1855 was in a state of utter chaos. His account of the condition of the City at that time, especially as regards sanitation and water supply, enables us to mark the immense progress made in the latter half of the century.

> Sanitation in poor districts was neglected. . . . The system of main drainage had not at that time been inaugurated. Cesspools and drainage into small streams, and into the Thames itself, left London open to outbreaks of virulent epidemics. The Thames had become a vast sewer, which was supposed to carry out to sea the sewage of a rapidly growing town, but which, in reality, only carried it down till, with the turn of the tide, it bore it back again, to deposit it on the banks of the river, or to return still more putrid; its exhalations carrying germs of disease. No wonder that, from time to time, cholera broke out with terrible effect upon the death-rate.
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> The water supply of London was also in a bad way, the liquid sewage of the Thames being taken from the river at Chelsea and distributed to the district adjacent; and in many places pumps and wells were the only means of supply.

The Managers of the Metropolitan Gas and Water Companies of the present day have cause for thankfulness when they contrast the governing bodies with which they have to deal in regard to repaving of streets, and in whose administration their Companies are, as ratepayers, considerably interested—cantankerous and extravagant as many latter-day local authorities are—with the public bodies with whom their predecessors had to contend.

> The various governing bodies in London were either Select Vestries or Commissioners of Sewers or Paving Boards. They were elected with varying qualifications, some upon a rating of £75, others not less than £10. They spent the ratepayers' money apparently at their own sweet pleasure; and they were not necessarily appointed to deal with a whole parish. In St. George the Martyr, Southwark, six Boards dealt with the paving of the streets, each with its own officials; in the Strand district, there were seven Paving Boards, each with its own staff of surveyors, clerks, &c.—all this at enormous cost, and without supervision.

Passing from the contemplation of this scandalous state of affairs, Mr. Seager outlines the effect of the Metropolis Management Act of 1855 and of the Local Government Act of 1894, and then summarizes the provisions of the present Act—"another step in the progressive path." His judgment thereupon, if not enthusiastic—the bias of the party politician betrays itself in this paragraph—is distinctly favourable.

> There is every prospect of the Act being a beneficial one for London; and if it does no more than to arouse public interest in local affairs among Londoners beyond what they have evinced in times gone by the Act will have conferred a public benefit.

It will also, we may add, have performed a big task. The apathy of Londoners to their own local government is colossal; and as it is, to a great extent, due to the unique social habits and conditions of our great city, it is in some degree inevitable.

The body of the work is taken up with the full text of the Act, including the schedules, which give the areas, population, and rateable value of the new Boroughs, the minor powers and duties to be transferred from the County Council, the powers to be jointly held by the County and Borough Councils, and particulars of the enactments repealed. Intercalated with the text, are copious explanatory notes. These notes occasionally sacrifice clearness to brevity, while punctuation is somewhat neglected; but, with these exceptions, the book seems to have been compiled with much care, is furnished with a full index, and constitutes a useful work of reference.

The Law of Meetings.—By George Blackwell, LL.B. (Butterworth and Co.)

This handbook relates to (1) meetings convened for social-political, and other purposes by persons under no legal obligation to hold such meetings; and (2) meetings convened by corporate bodies to discharge their statutory or common-law duties. With the first class of meetings, though possibly the more entertaining, we have no concern; and only a very small section of the book under review is devoted to the law governing the conduct of such assemblies. As regards the second class, the information given is very full and clear.

One of the most important points concerning shareholders' meetings is the question of privilege. The law thereon is defined by Mr. Blackwell as follows:—

> As regards slander—*i.e.*, spoken defamation—the occasion of some meetings is privileged. When, by virtue of the common law, or of some statute, persons meet to discharge public duties of an administrative character (*e.g.*, local authorities), or even, as in the case of shareholders, to safeguard their own interests, the occasion is privileged as regards untrue defamatory statements made, in the exercise of his duty, by one member to the others, provided the occasion is not used dishonestly or abused.

One or two dicta as to what constitutes a privileged occasion or the abuse of such an occasion are given. Lord Esher said, in the case of *Royal Aquarium Society v. Parkinson*, that—

> If a person, from anger, or some other improper motive, has allowed his mind to get into such a state as to make him cast aspersions on other people, reckless whether they be true or false, it has been held—and I think rightly held—that a Jury is justified in finding that he has abused the occasion.

Lord Cockburn, in *Parsons v. Surgey*, directed that—

> Where a shareholder of a Railway Company called a meeting of shareholders, and invited others, especially reporters, to attend, and at the meeting made defamatory statements about a Director of the Company, the matter was certainly one of great interest and importance to the shareholders; and the discussion or publication of the results to them would have been excused. But it could not be a privileged communication, because others besides the shareholders were invited.

It is, therefore, as both Lord Cockburn and Lord Fry have suggested, better to discuss such matters *in camerâ*.

The writer proceeds to enunciate the law in regard to the election and powers of the chairman; the keeping of order; the discussion of special business; amendments; the adjournment of a meeting itself or of the discussion of a particular question; the "previous question;" a motion to proceed to next business; and the closure (or motion "that the question be now put"). He also gives brief rules as to the general conduct of a meeting and of the persons attending it. Chapters 2 to 9 inclusive refer particularly to the holding of meetings by county councils and other public bodies. Chapter 10, dealing with incorporated companies, and particularly with companies incorporated by Special Act, will be of most interest and use to our readers. A company's Special Act, of course, governs the company as to all points specifically provided for in it; but as to other matters, the company—if incorporated since May 8, 1845—is governed by the Companies (Clauses) Consolidation Act, 1845, and subsequent Amending Acts. Mr. Blackwell gives the rules laid down by this Act as regards the summoning and conduct of general meetings, for the use of companies whose Private Acts do not make provisions expressly varying or excluding the clauses of the 1845 Act; and he quotes one or two judgments emphasizing the necessity for strictly adhering to the requirements of the Act—whether Special or General—governing any undertaking.

The book is of convenient size for, and would be most useful in, the pocket of the chairman of any meeting. It is clearly printed and well indexed.

Gas as Fuel in Japan.—We learn from the "Petroleum Industrial and Technical Review," the Editor of which is Dr. Paul Dvorkovitz, that there are in existence at the present time 127 establishments in Tokio where gas-engines are in use; and the number is gradually increasing. These establishments are classified according to their occupations as follows: Printing offices, 43; machine shops, 20; lithographers, 10; dyeing establishments, 6; gun factories, 5; electric power houses, 4; rice mills, 3; electro-plating shops, 3; tobacco manufactories, 3; soap factories, 3; miscellaneous, 27. A tendency also to use gas for cooking and other similar purposes is exhibited. Consequently the gas supply of the Tokio Gas-Works—the only one of the kind in the capital—has been increased by more than 50 per cent. during the last four months, as compared with the corresponding period of last year

THE DUTCH ASSOCIATION OF GAS ENGINEERS ON THE MANURIAL VALUE OF SULPHATE.

We have received a copy of a leaflet which is obtainable (gratis) of the Secretary of the Sulphate of Ammonia Committee of the Dutch Association of Gas Engineers, at his offices, at Bergen-op-Zoom. It comprises a terse exposition of the need for artificial manuring of agricultural land, and of the uses of the various kinds of manures. With reference to nitrate of soda and sulphate of ammonia, it explains in a few words the superiority of the latter for autumn applications. Stress is laid on the fact that sulphate, when applied as a top dressing or ploughed in during the autumn, is not washed out of the soil by the rains; and that the conversion of the nitrogen of the salt to nitrate, in which form plants are capable of assimilating it, takes place slowly in cold and rapidly in warm weather—thus closely anticipating the requirements of plants. Soils which contain a sufficiency of lime and potash are stated to give better results when manured with sulphate than with nitrate. The leaflet contains illustrations, drawn to scale, of crops and ears of wheat; in the one case with unmanured soil, in other cases with soil manured with stable manure alone, and with stable and artificial manures. The illustrations indicate in a striking manner the superiority of the artificially manured crops, and should serve to attract the attention of agriculturists into whose hands the leaflet comes to the reading matter it contains. We gather that similar Committees in other lands have issued the leaflet in other languages besides Dutch.

AN EXAMPLE OF GAS ENGINEERING WORK FROM WOLVERHAMPTON.

A splendid example of modern gas engineering is to be seen at Wolverhampton. There from a site presenting difficulties of no ordinary degree, owing to its treacherous character and uneven configuration, a large level expanse of ground has been formed, and thereon a complete new works has been constructed for the Gas Company, under the engineership of their professional adviser Mr. George Winstanley. A survey of the ground, and of the work which has been accomplished, impresses one with the amount of skill, care, and perspicacity which was required, and has been expended, in bringing out of what was an almost chaotic state of things, a works of which both the Company and the Engineer may well be proud; and it gives us pleasure to compliment Mr. Winstanley upon the result of his labour. The whole of the work was planned and designed by him; and the contract in its entirety was placed with the Winstanley Speciality Company.

The new site adjoins the old works; and to adapt it for the purpose for which it was required, a vast amount of excavation and levelling up was needed. On this ground the buildings have been admirably disposed; and in their situation and design the Engineer has had an eye both to future considerable extensions and comfortable and convenient working conditions. In fact, in regard to the latter point, one is struck, in walking over the site and through the various houses, with the air of freedom that reigns throughout; and there can be no doubt but that Mr. Winstanley is possessed with a strong belief in plenty of "elbow room" in a gas-works. The buildings have been projected for an eventual production of 5 million cubic feet of gas per day; but they are at the present time equipped for an output of 2½ millions, which is about the carbonizing power of the old section.

Some time since, under the advice of Mr. Winstanley, the Gas Company themselves constructed a new basin on the canal which runs into the works; and it is from this point that we will commence a description of the new works. Here there is a bridge crossing the canal, over which are carried the railway lines from the old works (giving communication with the Great Western and North-Western Railways); and beforetime there ran from the bridge an embankment covering a considerable space on the new site. It was upon this embankment that the work of reformation began. All the superfluous material was removed; and a strong retaining-wall to the embankment was built from the bridge to the end of the new coal-store. The wall is about 200 yards in length, and 20 feet high from the yard-level. The object of this work, which was an exceedingly difficult matter to deal with, was to reclaim valuable land which is now used for coal-storage purposes, and to continue the railway to the new coal-store. Walking along the line to this building, it is noticed that it is provided with bays in the side through which the coal may be discharged from the waggons, or the railway trucks may be taken into the house on an elevated railway running centrally down its full length. This elevated railway is carried on columns sufficiently strong to bear the heaviest engine sent in by the Railway Company. All the branch lines into the works, it should be stated, were laid by the Gas Company.

The coal-store (which is built alongside the new retort-house) is 154 feet long by 50 feet wide, and capable of containing some 3500 tons of coal; and on the ground which was cleared by the construction of the retaining-wall there is accommodation for 6000 tons more. Before proceeding further, it may here be mentioned that the whole of the new buildings bear a uniformity in design. They are constructed of local red bricks; and all with the exception of one (to be referred to hereafter) are roofed by an iron framework and slated. The houses certainly present a fine, substantial, and tasteful appearance; but at the same time no unnecessary expense has been incurred to secure external elaboration. But to return to the interior of the coal-store. The coal may, if required at the time, be unloaded direct from the waggons, by means of a shoot, into a coal-breaker, from whence it is elevated through the roof, into the new retort-house, where its transmission is continued by a cross conveyor, and then by others running at right angles to storage hoppers, capable of holding about 40 tons on each side. In a shed in one corner of the store is a 9 horse power Crossley gas-engine for driving the elevator and conveyor; and in connection with it there is a simple but ingenious contrivance for enabling the man in attendance on the coal-breaker to put out of action or re-start, from that position, the whole of the machinery dealing with the coal. The idea, it is interesting to hear, was suggested by one of the Directors of the Company; and it consists of a hand lever, which operates a long connecting-rod on which is a fork through which the driving band of the engine runs. If the man at the coal-breaker desires to put the machinery out of gear, one pull of the lever will move the fork, and throw the driving-band on to a loose pulley; and a similar return action will replace it.

Coming now to what is the central feature of interest in the new works, and upon which Mr. Winstanley has manifestly concentrated a great deal of thought and attention—that is the new inclined-retort house. Other good examples of inclined-retort work have been described in the "Journal;" and we are not prepared at present to say—in the absence of definite tests, and until the retorts have been fully at work—that the carbonizing results produced by this installation are unequalled by others. But this we may honestly say, that in certain respects it is unsurpassed by others which we have had the opportunity of inspecting. Dealing first with the main structure. It is 154 feet long by 90 feet wide; and its construction has necessitated the removal of some thousands of cubic yards of soil. At one end the house is gable finished; and the opposite end is merely a temporary one in view of future enlargement. Outside at the gable end, there is an extensive excavation down to the floor-level of the basement of the house; and it is proposed eventually to roof this over from the drawing-stage to the retaining-wall, so that coke may be run out and loaded direct into waggons on the railway siding already laid down there. Going inside the house, it is seen at once that due regard has been paid to obtaining that lightness and airiness which are so very desirable from every point of view; and, in making ample provision in these respects, the comfort of the workmen seems to have weighed as much with Mr. Winstanley as the other advantages which are secured by a reasonable spaciousness. That he has succeeded in his aim, we can testify; for, on a visit a few days since, neither on the charging-floor nor on the drawing-stage, although present during the operations of drawing and charging, did we feel the least discomfort from heat. This has not always been our experience. Another particularly fine feature of the house, and which will attract the immediate attention of an engineer, is the curved roof, which has an opening along the apex to form a ventilator in place of the usual louvre. The main principals are carried upon piers, 21 ft. 10 in. centres; and there are two intermediate rafters between each of the main girders, with three rows of trussed purlins. While the roof has a very light appearance, it gives all the strength required. The drawing-floors, which are 20 ft. 6 in. wide, are built on steel joist framework, with brick arches, and the spandrels are levelled up with concrete, and paved with blue brick. The measurement through the benches is 14 ft. 6 in.; and the charging floor is 20 feet wide. The latter is built on the same plan as the drawing-stages, with the exception that it has a grated ventilator running centrally its full length. For convenience in reaching the charging-floor of the retort-house, stairs have been provided in archways formed through the chimneys which divide the benches on both sides, and which are 75 feet in height.

The house is arranged for four sections of settings, each containing six beds of nine retorts, 17 feet long, set at an angle of 32°—that is, two blocks on either side of the house with the charging-floor running between. The settings are heated by Winstanley's regenerator furnaces. Up to now only two of the benches have been completed; but the arches of the other two have been constructed. The retorts are capable of taking a charge of 6 cwt.; but at present they are only being worked up to 5 cwt. The charging-waggons (which are fed by the large storage hoppers already referred to) run on overhead rails, and each waggon is divided into three compartments, each capable of holding a charge of 6 cwt. When charging, the waggons are moved into position over the retort; and, by means of a hand-lever, the charge falls direct through shoots (which are in three different lengths for the three tiers of retorts) into the retorts. During our visit, it was noticed that the charging did not occupy more than about 18 seconds per retort; that the charges were remarkably even; and that the heats of the retorts were exceedingly good. The spent charges flowed rapidly and cleanly from the retorts on being liberated; and round the retort mouthpieces there was a noticeable freedom from tar. The coke passes

through an opening about 18 inches in width, the full length of the bench, and by means of shoots is directed into trolleys running on rails in the basement below out to the coke heap. On visiting the basement, it was remarked that there was no perceptible heat being radiated from Mr. Winstanley's furnaces. There is one other interesting feature in the house, and that is a pair of tar-boxes, by means of which the regulation of one seal-valve maintains a level seal throughout the whole of the hydraulics in each bench. We must now leave the retort-house, with the one concluding observation that we have never seen a similar building in which the work is carried on more cleanly, and under better conditions.

Passing on to the other portions of the new works, we come to the condensing plant, which is divided into two sections. The primary one is an atmospheric condenser of the annular type; and from this the gas passes into an improved water-cooled condenser. This arrangement has been adopted in order that there may not be a too rapid cooling of the gas; and by it the temperature is always under control. The two sections are together equal to dealing with 2½ million cubic feet of gas per day. Hard by the condensers are underground tar and liquor tanks, 30 feet and 40 feet in diameter respectively. In their construction, the treacherous nature of the ground caused a great deal of trouble; but both are now sound, and are covered in with girders and arches. In close proximity is an elevated measuring-tank for supplying tar and ammoniacal liquor to boats, for which purpose pipes are laid from the tank to the canal. A special arrangement has been provided in order to ensure that this main is freed from tar when ammoniacal liquor is to be supplied, and *vice versâ*.

Coming next to the new engine and boiler house, it is found to contain two Lancashire steam-boilers, 28 ft. long by 7 ft. in diameter; and provision is made for the installation of a third one when required. These boilers are so large that fuel of a very inferior description can be used; and duplicate pumps are provided for feeding in case of accident. Adjoining is the exhauster-house, beautifully spacious, light, and clean. There are two exhausters at present in position, each one of which will deal with 100,000 cubic feet per hour. They are of the reciprocating type, and finished in a highly polished manner. They were specially made for the contractors by Messrs. R. & J. Dempster, of Manchester. Mr. Winstanley does not think there are any other exhausters in existence like them, and speaks of them as being splendid examples of thoroughly good work. The fly-wheels are unusually large, but in fine proportion. The floor of this house, it should be mentioned, is carried on rolled joist girder work, covered with York flags. In this way a rise of 2 ft. 6 in. is secured above the level of the yard and of 3 ft. 6 in. below the level; so that under the floor there is a space 6 feet in depth, which enables free access to the mains and connections. This block of buildings is capable, without extension, of treating 5 million cubic feet of gas per day; room being left, and foundations provided, for another boiler and exhauster.

A Livesey washer, equal to 3 million cubic feet of gas per day, is next seen; and this is followed by two tower scrubbers, each 13 ft. 4 in. diameter by 70 ft. high, also capable of dealing with 3 million cubic feet. They are so arranged that the gas may be kept in contact with the liquor fully a quarter of an hour. Behind the exhauster-house is another fine block of buildings, containing a workshop, pump and governor rooms, and the workmen's mess room, and roofed in by immense tanks containing ammoniacal liquor and fresh water. The new purifier-shed is a very substantial structure, with open sides; the framework being of strong columns and girders. It is 225 feet long by 50 feet wide. In putting down the purifiers, a considerable quantity of water was encountered; and consequently a thick concrete bed was laid down, and the lower plates of the purifiers (which stand on the ground level) are set on walls. The purifiers are six in number, and are 30 feet square by 6 feet deep, placed in line—the first four being for oxide, and the last two for lime. Around them is a loose boarded floor, which enables ready attention being given to the valves and mains. A travelling Goliath has been provided for removing the purifier-covers. Above the boxes is the oxide revivifying-floor, which is built of a girder framework, brick arches, and blue brick paving on top. There is a new departure here; Mr. Winstanley having applied a form of elevator for lifting, lowering, and carrying the oxide into position. It is really a friction hoist, with simple means for accomplishing the work. It is driven by a 4-horse power gas-engine; and there is no doubt the arrangement will effect a considerable saving. A lime-shed, in two bays, adjoins the purifying shed, and is sufficiently large to store the lime for the purification of 5 million cubic feet of gas per day. The last of the new buildings is the station-meter house, which contains a meter (by the Gas-Meter Company) for 2½ million cubic feet a day, and foundations for a second one when required.

As already mentioned, the entire contract was in the hands of the Winstanley Speciality Company; and for them Messrs. R. & J. Dempster supplied and erected the whole of the iron-work, with the exception of the boilers, meter, elevator, and conveyor. Mr. Winstanley, the contractors, and all concerned, are to be congratulated upon the manner in which the whole of the work has been executed, and the Gas Company's Manager (Mr. P. G. Winstanley) upon being equipped with plant which, we are convinced, will, in working results, stand well in the front rank of the gas-works of this country.

PERSONAL.

The Directors of the Colchester Gas Company, at their meeting last Friday, unanimously resolved to increase the salary of their Engineer and Manager, Mr. HERBERT S. PIKE, by £100 per annum.

The will of the late Mr. HENRY SIMON, of Manchester, whose death was recorded in the "JOURNAL" for the 1st of August, has been proved at £146,795 net. He has not made any bequests to charitable institutions, because during his life he did what he thought right in that way.

Mr. W. GRANGE, who has been Town Clerk of Grimsby since 1861, was last Wednesday presented with the freedom of the borough and his portrait. Mr. Grange, who is in his 79th year, was one of the promoters of the Grimsby Water Company, of which the firm of Messrs. Grange and Wintringham are still the Secretaries and Solicitors.

Last Wednesday, the Sheffield City Council recognized the eminent services rendered by Sir F. T. MAPPIN, Bart., M.P., and Sir H. STEVENSON, by conferring upon them the honorary freedom of the city. The former, it will be remembered, is the Chairman, and the latter a Director, of the Sheffield United Gas Company. In submitting the proposition to the Council, the Lord Mayor (the Right Hon. Alderman W. E. Clegg) referred in eulogistic terms to the work done for Sheffield by both the gentlemen named.

The difficulty in connection with the appointment of a Borough Accountant at Oldham, to which reference was made in the "JOURNAL" last week, has been removed by the withdrawal of Mr. ARTHUR ANDREW, who, in deference to the wishes of the Gas and Water Committees, will resume his position of Superintendent of the Gas and Water Departments of the Corporation. In a letter from Mr. Andrew which came before the Town Council last Wednesday, he said he considered this position was one in which he could best serve the interests of the Corporation. The way is now clear for the appointment of an Accountant, whose salary is to be £300 per annum.

OBITUARY.

The death took place last Tuesday, at his residence at St. Leonards, of Alderman T. ELWORTHY, Chairman of the Water Committee of the Hastings Corporation. Deceased, who had been ailing for some time, was in his 73rd year.

It is with sincere regret that we record the death, last Saturday morning, of Mr. WILLIAM HENRY HAGUE BROADBERRY, Engineer and Manager of the Tottenham and Edmonton Gas Company. Deceased was born on July 14, 1831, at Cottingham in Nottinghamshire. He came to London in 1842, and entered the service of the South Metropolitan Gas Company. He subsequently went to the Phœnix Gas Company, at Greenwich, as Inspector under the late Mr. Robert Hunter; but he resigned the position on being appointed Manager of the Grays Gas-Works. After being a short time with the Company, he returned to Greenwich. In the year 1855, he received the appointment of Manager of the Southend Gas Company, which position he filled till August, 1874, when he was selected by the Directors of the Tottenham and Edmonton Gas Company to fill the post of Engineer and Manager rendered vacant by the death of Mr. David Barclay. During his 25 years' management at Tottenham, the business of the Company has grown enormously. The output of gas in 1874 was 91,507,000 cubic feet; while during the year 1898 it was 522,851,000 cubic feet. These figures testify that the whole of the manufacturing and distributing plant has been entirely remodelled to Mr. Broadberry's designs. He was one of the founders, in conjunction with the late Mr. James Eldridge, of Richmond, and the late Mr. A. H. Wood, of Hastings, and others, of the Southern District Association of Gas Engineers and Managers; and he filled the presidential chair of the Association in 1881. He was a member of the Evening Star Lodge No. 1719 of Freemasons, and also a Trustee of the Loyal Bruce Castle Lodge of the Manchester Unity of Odd Fellows. After a week's painful illness, he passed peacefully away, apparently in his sleep, through failure of the heart's action. The end came unexpectedly, as on Friday the physician pronounced him to be progressing towards recovery. The funeral will take place at Tottenham Cemetery at three o'clock to-morrow afternoon.

The Utilization of Coke Dust as Fuel.—An attempt made some time ago in Germany to convert coke dust into briquettes, with cement consisting of cellulose residue, did not succeed, because prolonged drying in the open air was necessary for the briquettes to stand carriage; but in that case they crumbled in the fire, while they also burnt so slowly that the furnace could not be kept at the desired temperature. For counteracting these disadvantages, it was proposed to mix nitrate of soda with the cementing substance; but the only method which has hitherto been found to give good results is to use the dust itself as fuel, with one of the devices for feeding powdered fuel which have recently been introduced.

NOTES.

Dampness in Corrugated Iron Buildings.

The question of keeping damp out of corrugated-iron buildings has much exercised the correspondents of the "Ironmonger." A writer on the subject gives his experience, as follows: Galvanized corrugated iron for roofing purposes is not good in a stagnant atmosphere saturated with humidity. It is clearly borne out that where this condition exists the underside of the roof will show decay while the outside still looks perfect. Constructors of temporary shelters of this convenient material are apt to expect too much from it; and it must not be overlooked that these temporary structures are often condemned by force of circumstances to a much longer period of service than was originally intended. Consequently, it is as well to use, in towns at any rate, sheets of No. 18 B.W.G.; whereas in the ordinary way sheets of No. 26 B.W.G. are often put together and expected to last for years. Even with the thicker metal, experience dictates that it should be protected with a good coat of red-lead or iron oxide paint, put on before the roof is made; because corrosion always sets in first at the laps. The paint need only be applied to the underside of the roofing, which will have the effect of equalizing the durability of both sides. The top always stands well. In the United States and other countries enjoying a dry, continental climate, corrugated sheeting of No. 26 gauge or less stands perfectly well for many years. Under these conditions it appears to be practically indestructible; but when the climatic conditions are such as to promote condensation of moisture on the underside, the material requires looking after.

The Present Condition of Mechanical Road Traction.

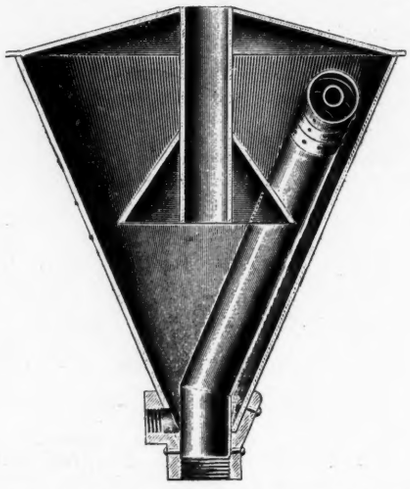
One of the subjects discussed at the British Association meeting was the progress realized in recent times in the application of mechanical driving to road carriages. Sir Frederick Bramwell expressed the opinion that for goods traffic steam, with coke or Welsh coal fuel, is the best and least objectionable means of propulsion. He is convinced that for this description of traffic steam will prevail over oil power, because it is simple and easy to control, there is no danger of explosion or conflagration, and the vehicles do not leave an offensive trail in the atmosphere. Mr. Worby Beaumont declared that motor-vehicles damage the roads less than horse carriages. He also agreed that steam will survive oil, owing to its greater flexibility, for goods traffic. For light carriages, the conditions are altogether different. In the course of his remarks, Mr. Beaumont referred to an exhibit of cast iron of remarkable toughness. Thin punched plates were shown, the punchings being remarkably clean and without cracks; neither did the plate round the hole appear to have suffered. This iron was produced simply by blowing dry steam into the cupola. It was also stated that the castings will bend rather more than is ordinarily the case, without breaking. If such a material is procurable, other industries than the motor-car manufacture will be greatly benefited thereby. Professor Fitzgerald reverted to the question of the roads, declaring that the steam-roller made roads of Ireland are the very worst in the world—in short, they are only comparable to the Thames Embankment! The fact of the roads never having been properly made accounts for their rottenness, despite the rolling. This is a severe satire on the steam road-roller, beloved of local authorities, but not so greatly admired by the owners of main pipes buried in a yielding subsoil.

The Liquid Carbonic Acid Gas Industry.

An interesting industry, of quite modern creation, is that of liquefied carbonic acid gas, which is being largely used for a variety of purposes. It is carried on, according to "Engineering," at a factory in Dace Road, Old Ford. The carbonic acid gas is obtained from the products of combustion of coke in the furnaces of two boilers. It strikes one that there would be any amount of it available as a bye-product of an ordinary gas retort-house. The furnace gases are led into scrubbers, through which is maintained a steady trickle of potash lye. This liquor is then passed into the boilers, where the carbonic acid gas is driven off by the heat, and passed on to the compressing pumps. The regenerated lye is returned to the scrubbers to absorb a second charge of the gas, and so on. Thus the process, in its manufacturing aspect, is a continuous cycle; but, in order to secure a pure product at a low working cost, certain precautions are necessary. In the first place, coke generally contains some sulphur, which burns to SO_2; and if this were allowed to reach the scrubbers, it would convert part of the potash into potassium sulphate, which would spoil it for the purpose of absorbing carbonic acid. This loss has been largely prevented by washing the gases coming from the furnaces, first in hot water and then with cold. The hot-water washer, or scrubber, is filled with fragments of marble or hard limestone. The hot water is provided by the condensers of the carbonic acid gas, which, immediately on leaving the lye boilers, is passed through pipes in a water-tank. The wash water, after passing through the scrubber, is allowed to run to waste. Behind the hot-water scrubber is a cold-water scrubber of similar construction. The lye scrubbers are filled with coke on trays, which is kept wet by the absorbent, as already described. On reaching the top of these towers, the remaining gases escape off into the atmosphere. The lye boilers at the Old Ford works are ordinary steam-boilers of the Cornish type, worked at 5 lbs. pressure. The joints have to be exceptionally good if the lye is to be kept in, as this liquid is a solvent of iron rust. "Woodite" is the jointing material for the pipes. The compressing pumps work up to about 1000 lbs. pressure. The liquid is sent out in bottles holding 28 lbs. of carbonic acid.

A Separator for Steam and Water.

The accompanying illustration of the Sturtevant exhaust steam-pipe head is a suggestive application of natural forces to a desirable end. The disposal of the exhaust pipe in connection with non-condensing engines is sometimes a source of considerable anxiety, in a small way. If turned into the boiler chimney, it is likely to give trouble as regards the structure; and if the pipe is merely carried up into the open air above the roof, there is always a certain amount of drip, which is a nuisance. The appliance we now figure is designed to prevent the worst of this



trouble by completely entrapping all the grease and water in the exhaust steam, without throwing any back-pressure upon the engine. It effects this by utilizing the separating effect of centrifugal motion on a mixture of gas and fluids. The steam, entering at the bottom, is discharged at the opening at right angles to the rising pipe. This gives it a whirling motion inside the head, thus causing the heavy matter to be thrown outwards against the shell, down which it flows, to be drained away by the side outlet at the bottom. Incidentally, the large exposed and comparatively cool exposed surface of this shell assists condensation, thereby reducing the amount of escaping steam. The dry steam escapes finally through the vertical pipe; while the internal inverted cone absolutely prevents the escape of any liquid through the opening in the top. All spray is thus avoided, the rotting of roofs and walls due to continued dampness is prevented, and the incidental expense of repairs is eliminated. Hoods are made for all standard sizes of pipe. It might be asked whether the separation of tar and water from coal gas in process of manufacture might not be effected by similar means.

Incandescent Burner Patents.—We understand that before the Comptroller of Patents yesterday, there was an important fight over the question of the amendment of the famous De Mare patent, which is alleged to control the Kern patent held by the Welsbach Company. The Welsbach Company opposed the amendment; but in the end the Comptroller allowed all that the Sunlight Company asked for.

Institution of Mechanical Engineers.—The Council of the Institution of Mechanical Engineers having decided to hold monthly general meetings during the ensuing session, the first of such gatherings took place last Friday, in the new buildings of the Institution at Storey's Gate, St. James's Park. The chair was occupied by the President, Sir W. H. White; and there was a full attendance of members. In opening the proceedings, the President referred to the fresh arrangements, and said the Council looked to the members to help them in every way possible in the new departure. A paper was then read by Mr. W. Ingham, of Torquay, on "The Incrustation of Pipes at the Torquay Water-Works." He described the mechanical action of the scrapers constructed to remove the incrustation from the water-pipes, and the increase in the discharging power of the mains effected by their use. Speaking generally, he said it might be laid down with a fair approximation to the truth that well waters had not so great an action on pipes as those from upland gathering-grounds, but where the water was soft the corrosive action would be greater. Filtered water had also a less corrosive power than unfiltered water. Much had been done to get a satisfactory coating for pipes; but there was still considerable room for improvement. It was hardly necessary to point out that a fortune awaited the man who could invent something that would withstand the action of soft waters. A discussion followed, and the meeting was adjourned until the 24th prox.

TECHNICAL RECORD.

MIDLAND ASSOCIATION OF GAS MANAGERS.

The Autumn General Meeting of the Association was held last Thursday, at the Grand Hotel, Birmingham—the PRESIDENT (Mr. J. S. Reeves, of Bilston) in the chair. There was a good attendance of members; several no doubt being attracted by the prospect of a visit to Smethwick, to inspect one of the latest installations of inclined retorts, which embodies several of the best features which experience has suggested for obtaining good results at a minimum working cost.

CONFIRMATION OF MINUTES.

The HON. SECRETARY (Mr. C. Meiklejohn, of Rugby) opened the proceedings by reading the minutes of the Annual General Meeting held on March 2, and of the Spring Meeting held at Bilston on May 31; and they were confirmed.

NEW MEMBER.

There was only one member for election—Mr. William Langford, the Engineer and Manager of the Longton Corporation Gas-Works; his nomination being heartily endorsed.

APPOINTMENT OF OFFICERS.

The PRESIDENT said the next business was the election of office-bearers for the ensuing year. As the members were aware, Mr. J. Ferguson Bell, of Stafford, was the Vice-President; and in electing him to this position, they anticipated his elevation to the higher office. He had therefore great pleasure in proposing that Mr. Bell be elected to that position.

Mr. W. BELTON (Shrewsbury) seconded the motion, which was carried by acclamation.

Mr. BELL thanked the members for the honour they had done him by appointing him to the distinguished office of President. During the coming year, he assured them, he should try to discharge the duties to their satisfaction. They had elected him to a position he had never sought; and he had taken it in the hope that each member would give him his hearty co-operation, so that the Association might do as good and useful work in the future as it had done in the past. The Association existed in order that the gas industry might be benefited; and in this industry they were one and all interested.

The PRESIDENT had much pleasure in next submitting the name of Mr. Thomas Glover, of West Bromwich, as Vice-President. With the contributions of Mr. Glover to the Association, they were all familiar; and he (the President) was sure he would make a good President when the period came round for him to undertake the duties of that office.

Mr. R. O. PATERSON (Cheltenham) seconded the proposition, which was heartily agreed to.

The PRESIDENT next remarked that the duties of the treasurership could only be adequately discharged by one person in the Association, and that was Mr. Peter Simpson; and on the motion of Mr. B. W. SMITH (Smethwick), seconded by Mr. R. KING (L. & N.W.R., Wolverton), he was re-appointed.

Mr. SIMPSON, in acknowledgment of the confidence of the members, observed that, though the position was an honorary one, it kept him somewhat in touch with the Association; and it would always give him pleasure to do what work he could for its good. Continuing, he said he had another duty to perform, and this he did with the greatest of pleasure. They had had a few Secretaries, and very good ones; and when he spoke of Mr. Meiklejohn, he was not going to say that he was better than those who had gone before, but he was quite as good. He had given the utmost satisfaction to the Committee; and it would be difficult to find one who would bestow more attention on the work.

Mr. W. NORTH (Stourbridge) seconded the motion, which was cordially agreed to.

Mr. MEIKLEJOHN, in thanking the members for having again shown their confidence in him by re-electing him Secretary, said he had suggested to the Committee, when the matter was before them, whether it would not be to the interest of the Association that some fresh blood should be introduced in this particular direction. As far as he was personally concerned, he had the impression that it might awaken fresh interest if a new Secretary were appointed, who would be able to break fresh ground which perhaps he (Mr. Meiklejohn) was not able to do. But the Committee had thought otherwise; and so long as it met with the approval of the members, he was willing to do as much as he could in the direction of furthering the welfare of the Association.

On the proposition of Mr. C. DAKIN (Cradley Heath), seconded by Mr. GEORGE HELPS (Nuneaton), Mr. Percy F. Winstanley (Wolverhampton), and Mr. Thomas Berridge (Leamington) were elected to the Committee in the place of the members retiring by rotation; and Mr. R. King was appointed a member in the place of Mr. W. Belton, who had resigned office.

Mr. P. H. Fletcher (Evesham) and Mr. C. Dakin (Cradley Heath) were elected Auditors.

Mr. G. HELPS then read the following paper, entitled—

NOTES ON THE HEATING OF GAS-RETORTS.

The author wishes it to be understood that his one object in submitting these few remarks is to obtain information. He has often heard it said that, when one knows nothing, the best thing to do is to keep his ears open and his mouth shut. This may suit some people; but surely there is no disgrace in exposing one's ideas, even if they are wrong, to the sharp fire of criticism. The more severely one is handled the more "impressions" are, as a rule, left; and the author hopes that, after the members have heard these notes, they will open such a fire of knowledge on him that he will be filled with it. He does not worry about the present position, because, as Ruskin says, "Our happiness as thinking beings must depend on our being content to accept only partial knowledge, even in those matters which chiefly concern us;" and in his determination to be happy, he allows this sentiment to cover the multitude of imperfections.

To proceed, the different systems of heating gas-retorts now in operation are probably covered by the following:—

1.—*Ordinary Direct-Fired Setting.*—The fuel being burned to carbonic acid by the admission of air below the fire-bars, with no attempt at regulating the supply of same.

2.—*Generator Settings.*—(A) The fuel burned to carbonic oxide and then converted to carbonic acid by the admission of cold air; both air supplies being capable of regulation. (B) Same as A, but the secondary air heated by conduction from the direct combustion in the setting. (C) Same as B, but the primary air also heated.

3.—*Recuperative Settings.*—(A) The fuel burned as in generator settings, but the secondary air heated by the waste gases. (B) Same as A, but with primary and secondary air heated by waste gases.

Ordinary firing is undoubtedly a thing of the past, and need not be discussed.

Generator settings without the heating of the secondary air can have but very few reasons for existence.

Generator settings, both with the secondary air heated and also with the primary and secondary air heated by direct conduction, deserve more attention than they have received, in the author's opinion, and will be referred to hereafter.

Recuperative settings are in great favour, and hold a position which, in the author's opinion, is untenable. He has to admit, however, that for some time he has been much fascinated by various ideas relating to recuperation; and among other considerations, the following at one time presented themselves as particularly worthy of note and adoption.

(A) The increase of the area of the walls dividing the waste gases from the secondary air, so that the waste heat would be utilized to the greatest possible extent.

(B) Reducing the thickness of the walls to a minimum.

(C) The heating-up of the primary air to 1500° or 2000°, or to about the same temperature as the secondary, and admitting it above the fire-bars.

Having had in use for some time several settings embodying these notions, the author offers a few remarks thereon.

For increasing the wall area, bricks were specially designed, in section the shape of the letter U or V, having closed ends, so that a portion of each brick projected from its bed, either from the waste gas passage into the primary or secondary air passage, or *vice versâ*; thus presenting a large surface to the waste gases. The thickness of these bricks was about $\frac{7}{8}$ inch. The bed of the brick was about 4 inches wide. Several of these settings have been at work, have given no trouble by short-circuiting, and, in addition, about 10½ cwt. of coke has been sold per ton of coal carbonized (from about two-thirds North Staffordshire and one-third Yorkshire coal). When it is stated, however, that, comparing them with other similar settings, having an ordinary solid 4½-inch wall between the waste gases and secondary air, no increased quantity of coke was obtained for sale from the same class of coal, you may be inclined to smile.

And now as to heating up the primary air. The author set out with much enthusiasm to heat the primary air to about 1500°, to start with. To do this it was, of course, necessary to admit the primary air above the fire-bars; it would not be much use heating the air and then admitting it under the fire-bars, where there is usually a quantity of dripping water. This was arranged satisfactorily, and the setting designed so that the primary air could be admitted either above the fire-bars, heated to about 1500°, or below, cold. The setting consisted of six retorts, 21 in. by 15 in. by 9 ft. 6 in. long, and worked exceedingly well with 4-hour charges. The average make per mouthpiece was 8000 cubic feet for a period of two months. The coke sold from this bed for the same time averaged 11¼ cwt. per ton of coal carbonized. After working two months, it was found that the hot primary air inlets were very badly burned away and clinkered up; so that it was necessary to shut off the hot primary air and admit the air cold. Of course, the air slides and dampers required re-adjusting; but after this was done, the results obtained, both with respect to fuel and heat, were in every way as good as those obtained with the highly heated primary air. We could detect no difference whatever in the fuel account.

In making a reliable comparison as to the actual fuel used in

different generators for retort heating, the following are taken to be some of the essentials:—

(A) The retort-settings should be exactly similar in each case.
(B) The temperature of the gases entering the regenerator should be known, with analysis of same.
(C) The temperature of the gases leaving the regenerator should be known, with analysis of same; or, in the case of generators, the temperature of the gases entering the main flue.
(D) The test for fuel used should be as extended as possible.
(E) The coal used should be from the same pit in each case.
(F) The make per ton should be noted.

The author regrets that, although he had all these things in mind, they were not acted upon; for when the tests were in hand, his connection with the Hinckley Gas-Works ceased. And thus it was that the furnace gases were not tested, nor the temperatures of the gases taken at the inlet and outlet of the regenerators during the different tests, &c. His object, however, in writing these notes is not to go into the question of the value of any particular system of recuperation, or to give fancy figures, in pounds of coke used per 100 lbs. of coal carbonized, but simply to state the main propositions which he considers may, by the results of these tests, taken in conjunction with other considerations (the experiences of the members, &c.) possibly be proved. The propositions are—

1.—That there is no real advantage to be gained in fuel consumption by heating the primary air with so-called waste gases.

2.—That there is no real advantage to be gained in fuel consumption by heating the secondary air with so-called waste gases.

3.—That all the advantages claimed for recuperation can be obtained by generator settings.

4.—That the best method of heating gas-retorts, horizontal or inclined, to-day is by having one producer for several beds, as introduced and adopted by Mr. Carpenter, at Vauxhall.

It will undoubtedly be admitted that all the gases entering the recuperator are not necessarily waste. The question then is, What can truly be designated waste gases in this connection? Surely, only such as are found at the entrance of the recuperator in an ordinary recuperative setting, with the producer, the setting, and the recuperator properly proportioned, so that no extra damper is required for the admission of sufficient secondary air into the setting, but just enough to cause the heated gases to travel at a sufficient rate through the setting to carbonize the desired quantity of coal in the retorts, whether for four, five, or six hour charges; the carbonizing heat being maintained at (say) 2000° throughout the setting, including the bottom retorts.

The author is not aware that many engineers take steps to measure the quantity and temperature of the gases at this point under these conditions. The only rule-of-thumb test is to watch the colour of one's main flue, or the last passage of the recuperator, without this being checked, speaking generally, by any test to discover whether too much secondary air is admitted into the setting, or whether cold air is being drawn into the waste-gas flues by faulty brickwork in the front wall or elsewhere. There are some tests by Dr. Schilling, given in "King's Treatise," Vol. III., which show a considerable utilization of heat units by the recuperator; but if the author follows Dr. Schilling rightly, this utility is based on what he found in the recuperator. The question therefore is, Were the heat units passing into the recuperator more than was necessary to keep his bottom retorts at 2000°?

The following figures, relating to the approximate percentage of total heat generated required for the heating of the secondary air, are chiefly taken from "King's Treatise," Vol. III.

The heating power of	C	burning to	CO	is	4,453 units per lb.
"	" C	"	CO_2	"	14,544 "
"	" CO	"	CO_2	"	4,325 "
The specific heat of			CO_2	"	0·2169
"	"		N	"	0·2440
"	"		CO	"	0·245
"	"	furnace gases		"	0·236

Specific heat of water taken as unity.

It is known that for the conversion of 1 lb. of C to CO 5·80 lbs. of air are necessary, which, combined with the C, form 6·80 lbs. of producer gases, containing 2·33 lbs. of CO, and that the secondary air required to contain sufficient O to combine with this 2·33 lbs. of CO to form CO_2 is 5·80 lbs. also. The temperature of the producer gases generated by the primary combustion is $\frac{4453}{6{\cdot}80 \times {\cdot}245} = 2672°$; and by the admission of the theoretical further quantity of secondary air (cold), the temperature is lowered to $\frac{4453}{12{\cdot}6 \times {\cdot}236} = 1494°$. But by the second combustion we obtain an intensity of $\frac{4325 \times 2{\cdot}33^{\circ}}{12{\cdot}61 \times {\cdot}236} = 3386°$, and to this we have to add the temperature of the gases before the second combustion is assumed to take place—1494° + 3386° = 4880°. We therefore find that 1 lb. of C burned to CO_2 heats the 12·61 lbs. of furnace gases, which are necessary for its combustion to 4880°.

A heat unit is the quantity of heat that will raise 1 lb. of pure water 1° Fahr., or the quantity of heat required to raise 4·2 lbs. of air (52½ cubic feet) 1° Fahr. If it is assumed that 12·61 lbs. of furnace gases heated to 4880° are equivalent to the heating of $\frac{12{\cdot}61}{4{\cdot}2}$ lbs. of water = 3·002 lbs. of water heated to 4880°, we obtain 14,737 lbs. of water heated 1°, or a heat value for carbon of 14,777 units per pound, which is not quite correct; but the difference is not material.

In theory, the heat of the gases when converted to CO is 2672°; and therefore we may consider that the secondary air must be heated to this temperature. It is known that 1 lb. of C requires as secondary air 5·80 lbs. of air; and to raise this quantity of air to 2672°, the heat units required would be 3689.

To raise 4·2 lbs. of air 1° 1 unit is necessary.
" 5·8 " " " $\frac{5{\cdot}8}{4{\cdot}2}$ " "
" 5·8 " " $2762°$ $\frac{2762 \times 5{\cdot}8}{4{\cdot}2}$ " "

These are the heat units, then, that are required, in theory, to heat the 5·80 lbs. of air up to 2672°, or to heat the necessary quantity of secondary air for the proper gaseous combustion of 1 lb. of carbon. Now, if it be assumed that the secondary air was heated by waste gases to 2672° before its admission into the setting, we must reckon that the temperature was not reduced by its admission, but remained at 2672°. This will give a temperature of $\frac{4325 \times 2{\cdot}33}{12{\cdot}61 \times {\cdot}236} = 3386 + 2672° = 6058°$ for the secondary combustion, which is equivalent to the heating of $\frac{12{\cdot}61}{4{\cdot}2} =$ 3·002 lbs. of water raised to 6058°, or a development of $6058 \times 3{\cdot}002 = 18{,}188$ heat units. Now, assuming that 18,188 heat units are generated when the secondary air is heated to 2672°, and that it takes 3689 units of heat to bring the secondary air to this temperature, the theoretical saving in fuel for recuperation should be $\frac{3689}{18188} = 20{\cdot}28$ per cent.

It was this idea of saving another 20 per cent. of fuel which caused the author to consider the advisability of highly heating the primary air. He had heard so much said as to the enormous quantity of waste heat there was at the disposal of the gas engineer in recuperators, and that for the heating of the secondary air it was not nearly all required, &c., that he accepted this doctrine; and argued that, assuming the secondary air to be all heated by waste heat and 20 per cent. of the fuel saved, there would be an equivalent advantage in the heating up of the primary air. The theoretical quantity of air required for the primary combustion being equal to that required for the secondary combustion, it follows that the heating of the primary air to (say) 2000° should have the same effect on the fuel account, &c., as heating the secondary air to 2000°.

In each case, is not the same amount of heat units conveyed into the setting? This is a point on which the author would much like the opinion of the members. The practical way to decide the matter would be to test the temperature of the producer gases when hot primary air is used, and compare it with the temperature when cold primary air is used. The author has tested the fuel consumption of a recuperator with the division-wall ⅞ inch thick and of large area, against the fuel used in a similar setting, but having the division-wall of small area and 4½ inches thick, and has been unable to discover any advantage in the fuel account—and he was anxious to find it. He has also tested the effect of heating up the primary air by presumably waste heat to about 1500°, and been unable to discover any advantage in the fuel account. He therefore submits that if a test be made of the actual waste heat from a properly proportioned producer setting and recuperator, both for quantity and temperature, entering the waste-gas flue, so that the heat units could be calculated, and another test made for quantity and temperature of the gases entering the recuperator—the conditions being practically perfect, and no fuel used beyond that required for maintaining the temperature of the bottom retorts at 2000°—it will be found that the quantity of waste heat being utilized in heating the secondary air would not nearly warrant the attention it has received for a number of years; and that, practically, its recovery has no beneficial effect on the fuel consumption as compared with the results to be obtained by heating the secondary air by direct conduction.

Of course, there never has been any question as to the advisability of heating the secondary air. It is clear that in a highly heated state it is in a much better condition for mixing with the producer gases, &c. The only doubtful point has been whether the secondary air is best heated by waste gases or by direct conduction. It appears to the author that opinions adverse to generators are held because, more often than not, generators in which the secondary air is heated to a very nominal temperature are compared with recuperators with the secondary air heated to about 2000°. Another reason for the favour in which recuperators are held is that a recuperator is good looking, and so appeals to young men, particularly when they see a good, bright heat under the bottom retort of a setting, or at the inlet of the recuperator, and compare it with the heat entering the waste-gas flue, without considering any excess of cold air that may be present—in fact, being quite in the dark with regard to the composition of the waste gases. The very fact of naming the gases as they enter the recuperator "waste" has perhaps something to do with it.

Some gas-works having settings of five small retorts on the

generator principle, with the secondary air only heated by direct conduction to a few hundred degrees, and using a mixture of North Staffordshire and Yorkshire coal, sell 10 cwt. of coke per ton of coal carbonized! Again, to take the case of a works using a coal giving 13 cwt. of coke, of which 10½ cwt. are sold per ton of coal carbonized in the recuperative setting. Here 2½ cwt. of coke are required for the carbonization of 1 ton of coal; and if the theory is correct, that with a proper recuperative setting there are sufficient waste gases at the inlet of the recuperator to heat the secondary air, we should require for the distillation of 1 ton of coal in a generator setting 2½ + (20 per cent. of 2½) = 3 cwt. of coke, and there would only then be a loss of ½ cwt. of coke for every ton of coal carbonized. How, then, can the claim made by some people, that recuperation saves 1 or 2 cwt. of coke per ton of coal carbonized, be sustained? All these considerations point decidedly to the proving of all the propositions submitted.

The author has permission, by the courtesy of Mr. Carpenter, to refer in these notes to a paper on the subject read by him before the Southern District Association as long ago as 1886, in which he pointed out that, with a recuperator of an excellent design—certainly one which no recuperator with which the author is acquainted at the present day can surpass—there was no advantage in recuperation. Mr. Carpenter, referring to recuperation, said that, "in spite of the most elaborate air-heating, the fuel economy was then only fractionally higher than with the simpler method. To push further the information thus obtained, the regenerator in one setting was bye-passed entirely, when the fuel used was found to be increased by less than 1 lb. per 100 lbs. of coal carbonized." Mr. Carpenter also shows, at this date, that he was able to sell from beds of sixes between 11¼ and 11½ cwt. of coke, including breeze, per ton of Newcastle coal carbonized in his generator settings; and the writer has been unable to discover where this has been surpassed in practical working by any so-called recuperator at the present day. From settings of eight, Mr. Carpenter is now selling 10½ cwt. of coke and 1 to 1½ cwt. of breeze.

Some conservative engineers may doubt the exactness of the test made by Mr. Carpenter when he bye-passed his recuperator, and also the other tests referred to. To them the author would respectfully suggest that before spending any further money on regenerators they should construct a setting having the required essentials for the comparison, and make the test themselves.

The author is so much impressed with what he has seen at Vauxhall, by the courtesy of Mr. Carpenter, that he is of the opinion that, even in small works, one producer for a number of beds is the most efficient and economical system for heating retorts.

In conclusion, he apologizes for any indiscretions in the wording of these few notes. He trusts that if he is incorrect in any or all of his ideas, members of the Association will take such steps as will thoroughly convince him of his errors.

At the close of the paper,

The PRESIDENT said the paper dealt with a very important subject, and one in which the members were all interested. It was too much to expect that they could follow Mr. Helps in the figures he had given them at such short notice, and without having the paper before them. But the general subject he was sure would command a good discussion.

Mr. HENRY HACK (Saltley, Birmingham), called upon by the President, said it was not his intention to speak on the subject. Of course, he had had a great deal to do with regenerative furnaces and furnaces of all kinds; but he would have been better prepared to have spoken on the question if the suggestion which was made some years ago during his term of office, and which he hoped would still receive the attention of the Committee, had been carried out—of having the papers printed before the meetings, and distributed among the members, who would then be in a better position to discuss them. Mr. Helps, in the title, described his contribution as "Notes." If these were described as only notes, he did not know what a paper by Mr. Helps would be like. (Laughter.) Touching the proposition which the author had brought before them, he (Mr. Hack) could only generally say what his experience had been. As regarded ordinary firing, Mr. Helps, of course, dismissed that as no longer worthy of attention. He then proceeded to speak of generators. Well, his (Mr. Hack's) own experience was that with single generators heated from a furnace, they did get a considerable reduction in the fuel account, and a better distribution of heat. With regenerator furnaces, with the secondary air heated but not the primary air, they got a considerable advance upon the single generator. His experience was, further, that, by the heating of the primary air, they did obtain still greater advantages, and that the fuel account was less than in any of the other systems. He certainly should, wherever he could, apply the heating of the primary air as well as of the secondary air; and should recommend it to be done, as being the most efficient furnace extant at the present time. He had had no experience whatever as to the outside furnace spoken of by Mr. Helps, and which was in operation in London at the South Metropolitan Gas-Works. His opinion, however, was that they would not get better results from the outside generator than they would do from a well-constructed regenerator where the primary air was heated and the secondary air also. His view was that it was not possible. There must be some loss of heat in its passage from a large outside generator to the various settings. He knew that it had been stated otherwise; but he could not come to any other conclusion. As time went on, and they gained further experience, his opinion might alter; but at present this was his view on the subject. He congratulated those who were wise enough to introduce regenerator furnaces some time ago, when it was said that it would not be worth while to save a little fuel, or the benefits would not equal the trouble of putting in such costly structures as regenerator furnaces. Those who did so, did the right thing; and with the present high price of coke, they were reaping the fruit of their foresight. Regenerative furnaces were, in his opinion, likely to be continued in most works.

The PRESIDENT remarked that the views that had been advanced by Mr. Helps in his interesting paper ran contrary to common experience, or to the experience which he apprehended a good many of the members had had; and they were at a disadvantage in discussing a paper of so technical a character without having it before them for consideration prior to the meeting. Therefore perhaps the best thing for them to do would be to adjourn the discussion to the next meeting, as it would be a pity for such a paper to be set aside with insufficient discussion. In the meantime, some of them might possibly be able to make experiments on the subject.

Mr. BELL agreed with the views of the President as to postponing the discussion. It was quite impossible to criticize the figures, and adequately discuss the paper, without consideration, as some of the views enunciated in it were not in accordance with the practice of many members present. He did not think anything would be lost by adjourning the discussion.

The HON. SECRETARY pointed out that the advantage of getting papers in print before the meetings had not been lost sight of by the Committee; but the writers of papers could not always get them prepared in time for this to be done. In this case, it could not be done, although it would have been a great advantage, as it was impossible in talking of specific heats and percentages to retain the figures in mind, and to keep to the point in the discussion. He would therefore propose the adjournment of the discussion.

Mr. W. WINSTANLEY (Newcastle-under-Lyme) seconded the proposition, which was agreed to.

Mr. HELPS observed that he had been too busy to complete the paper in time to have it printed before the meeting; and he willingly acceded to the desire of the members to postpone its discussion.

Mr. B. W. SMITH (Smethwick) was then called upon to read the following paper:—

INCLINED RETORTS.

As it is arranged that a part of this day's programme includes a visit to the Smethwick Gas-Works, particularly to see the inclined installation in operation, I have been requested to give a short paper upon this important subject.

As you are all aware, "Inclined Retorts" have now passed through the experimental stage; and what has been in a measure an obstacle to many who proposed carbonizing under this system was entirely removed by the expiration of M. Coze's patent in this country on the 20th of June last. The installation which I shall have the pleasure of showing my colleagues this afternoon will, I believe, be found to be, although small, one of the most improved type. It consists of a bench containing four beds of eight Ω retorts in each, 20 ft. long by 24 in. by 15 in. at the bottom, tapering to 20 inches by 15 inches at the top; being set at an angle of 32°, and surrounded by a retort-house 57 ft. by 56 ft. by 42 ft. 6 in. high from floor-level to wall plate. As it is not my intention to weary the members—as is too often done—by giving a complete specification of the work, I shall touch but lightly upon figures.

The contractor for the retort-house shell commenced his work on the 16th of May, 1898; and the arches were ready for filling-in on Oct. 19, 1898, at which date the contractors for this work, and also the whole of the ironwork, started upon their part. On Jan. 4 last the fires were put under for drying, and kept on till they were increased to obtain the proper temperature, when the retorts were charged on April 26, since which time, I am pleased to say, they have been kept at work incessantly without one single hitch—except on one occasion when the mains were opened to see what deposit, if any, of pitch or thick tar had taken place.

The chief features for the members to see will be the uniform heats, the mode of charging, the even charges, and the easy way of discharging the coke without tickling. The whole of the retorts are heated upon the regenerator principle, very similar to the plan adopted by Mr. Shoubridge at Salford, having specially prepared bricks for the furnace arches and combustion chambers. Perfect control, to insure uniformity, is gained by sliding bricks which I have had placed over the ports of the secondary air and furnaces gases; so that in adjusting one both are adjusted, and any local heating is at once avoided. The exit gases to the main flue, which runs under the setting, are controlled by two dampers on each side, placed immediately over the last return, and are again controlled by two dampers, one to each portion of the chimney, a few feet above the floor-level. The fires are charged direct from the centre retorts only, which we find to be about sufficient to maintain the heats; and from working results they require from 11 to 11½ lbs. of coke for every 100 lbs. of coal carbonized—varying according to the quality of coke produced.

The weight of the charges at present averages 6½ cwt. every six hours; but as soon as the coke-conveyor is at work, I have found, from experiments, that I shall be able to have the same weight every five hours. The coal so far is shot down from the carts to the elevator-pit; being fed by men with shovels. The time occupied in filling the storage-hoppers is about 4½ hours. This I hope to have altered next year, so that the coal may be fed direct from the trucks from an overhead railway into a large storage-tank, to automatically feed the elevator. There is provided the usual crusher for breaking the large coal and cannel, and in front of this a shoot with grating is attached, so that when using nuts or fine coal it may bye-pass the crusher. The coal which we have been using has been chiefly screened nuts supplied from Wigan, Derbyshire, and North Stafford, with an occasional quantity of larger coal.

The nuts, or crushed coal, is carried up by the bucket elevator, and emptied on to a push-plate conveyor, when it falls through openings fitted with slides into storage-hoppers, one over each bed, which will hold, when all are filled, from 50 to 60 tons. It then gravitates to measuring-chambers, to which special arrangement I would draw the members' attention.

There are three measuring-chambers to each bed; but they are not arranged on the "powder" or "shot" pouch system—this principle being essentially faulty from the fact that the doors are so connected together by levers that both top and bottom doors must, for a considerable portion of their travel, be open at the same time, thereby allowing coal to pass from the storage hopper into the measuring-chamber while the charge is being made. On the contrary, these measuring-chambers are so arranged that the top door must be completely shut before the bottom one can begin to open; and in its turn the bottom door must be completely closed before the top one can be opened. The arrangement by which this is done is very simple; and it has the advantage that the measuring is exact and certain, depending in no sense upon the quickness or slowness of the manipulation of the levers. The chambers are fixed to the bottom of the storage hopper; and each is worked by one lever hanging vertically when both doors are closed. By drawing the lever from its vertical position towards the retort-bench, the top door is opened; and by moving the lever from the vertical position towards the wall, the bottom door is opened, when the coal drops down into the charging-shoot. There are three of these shoots, running on rails, one for each tier of retorts, with an internal arrangement for checking the speed of the coal, which has been found absolutely necessary to ensure a uniform and proper charge; provision having been made in the measuring-chambers for adjusting the weight of coal from 6½ to 8 cwt. charges.

The charge when burnt off is allowed to fall by removing a stopper, of a pattern which has been found by the writer to be the most suitable for his purpose. After the coke is run out, the man on the charging-stage opens his lid to see if the retort is clear, pushing away any carbon or tarry matter that might remain in the top. This is a most important procedure, as any obstruction in the mouth of the charging-shoot tends to check the speed of the coal, and thereby produces uneven charges; and this, I think, is the cause in many instances of the complaint of charges having been undulating. In every case the man has to try, either before or after the charge is drawn, for any stopped pipes, which I am glad to say have so far given us little, if any, trouble. This may be due to the larger diameter—viz., 7 inches—of the ascension-pipes, and also to the use of a dry main instead of a hydraulic one. I believe that this is the first and only installation of inclined retorts to which the dry-main system has been adapted.

It will be noticed that there are twin mouthpieces to one pipe of the right hand and centre runners. This I designed with a view of having eight retorts in my setting; and I think if I have to construct again I shall endeavour to avoid this, as it is found that there is a little risk and inconvenience by having two retorts to one pipe; and this I believe is the cause of a slight deposit of pitchy tar in the dry-main directly below this pipe, due to the larger area necessary in the ascension-pipe and valve—viz., 9 inches diameter—allowing hot gases to pass off towards the close of the charge, and converting the tar into pitch, which we remove occasionally when shutting down on Sundays.

I have found that the yield of tar and ammoniacal liquor is slightly greater than with the horizontals; although to an observer, when the bottom lids are opened, more tar appears. It should be borne in mind, however, that the gas passes away at one end only of the 20-foot retort; and there is probably less tar from this one end than from the two ends of a 20-foot horizontal retort. When I first started, I endeavoured to lessen this tar by increasing the heat near the mouthpiece, but found the drying up of the tar was followed by a tendency to stopped pipes.

The retorts are easily scurfed, which I have had done once since starting, although but little carbon had formed. Much greater care is required in getting up the heats with inclines than horizontals. The size of coal should be fairly uniform; but I am of opinion that a difference in the angle of repose or speed in charging would be required for very fine coal. I have, however, experienced no creeping of the charge whatever.

Many gas engineers have been prejudiced against inclines, believing there must be a considerable loss of gas through an accumulation at the top of the slope which cannot be brought down, or else by the gas being decomposed by passing over a greater heated surface, besides a loss in the illuminating power. This, however, has not been my experience with the installation; the yield per ton and the illuminating power having been equal to the results obtained from the horizontals. With the best of the coal we are now using, and about 3 per cent. of cannel, our make is 10,500 cubic feet per ton of 16¼ candles. I have had a pressure-gauge fixed at the top and bottom of one retort, registering the pressure at these points during the six hours the charge is in. By these the members can see that there is no backed-up pressure at the top of the retort; and on the whole the diagram clearly shows practically uniformity at top and bottom. The slight rises denote where other retorts are shut off and put on.

The quality of coke, as will be seen, is much better than with horizontals; and certainly the drawing and charging cannot be beaten by any power machine. I tried the time it would take to draw and charge the whole of the 32 retorts, and found it could be done in 16 minutes. Of course, the members will not expect to see this done during their visit. At present we draw and charge every hour; and with the exception of the bottoms, six retorts are dealt with each hour. We employ three men per shift of eight hours to draw and charge, attend to fires, and wheel out the coke, against eight men per shift of eight hours with horizontals for the same number of beds. The attendance on the gas-engine, elevator, and conveyor is performed by an engine-driver, who is only there when the coal is being raised; and four labourers are employed the same hours, shovelling or wheeling the coal to the crusher or feed of elevator.

I will now give the members a few figures I have worked out as to the comparative cost from actual results of the horizontals and inclines; basing on a make per ton of 10,500 cubic feet.

	£	s.	d.	
The horizontals, including hand-drawing machinery, cost	715	0	0	per bed
=	89	8	0	per retort
The inclines, without house, and allowing proportion of gas-engine, crusher, and elevator for four beds (being designed for thirteen beds)	1091	10	0	per bed
=	136	8	9	per retort
Retort-house for ditto	334	5	0	per bed
=	41	15	7	per retort

The working results in retort-house with four beds only—

5-hour charges	horizontals	carbonize per week	382 tons,	costing	29·06d.	a ton
6 "	" inclines	"	291 "	"	18·10	"
5 "	" "	"	382 "	"	13·79	"

This cost includes all charges in retort-house—drawing and charging, coke and coal wheeling, raising coal to storage hoppers, and attendance to fires.

With regard to the cost of gas into the holders, which has been asked for by several members prior to preparing this paper, I have gone into this matter most carefully; and, basing the cost of coal, repairs, and residuals upon last year's results, and taking into consideration the capital account of the works only, omitting all district expenditure, and reckoning the interest and sinking fund at the same rate upon the increased cost of inclines over horizontals, I have arrived at the following figures:—

Per 1000 *Cubic Feet of Gas Produced into Holders.*

	Horizontals at 5-hour charges. d.		Inclines at 6-hour charges. d.		Inclines at 5-hour charges. d.
Coal	13·56	..	13·56	..	13·56
Purifying	0·50	..	0·50	..	0·50
Wages	2 91	..	1·86	..	1·64
Salaries	0·18	..	0·18	..	0·18
Repairs	1·34	..	1·34	..	1·34
	18 49	..	17·44	..	17·22
Residuals	7·60	..	7·60	..	7 60
	10·89	..	9·84	..	9·62
Add interest and sinking fund	3·76	..	3·76	..	3·76
Add additional interest and sinking fund	..	..	0·15	..	0·08
	14·65	..	13·75	..	13·46

Showing distinctly that, although the inclines are greater in cost, the net results are in their favour. Of course, I have not taken into consideration any extra cost in the tear, wear, and repairs, which time and experience will only show.

In conclusion, I should like to take this opportunity of saying how pleased I have been with the substantial manner in which the contractors have carried out their work. None of the machinery or building has given me the slightest anxiety; and it only proves the prudence, with inclines as with other work, of not having cheap work or inexperienced men to do it.

The PRESIDENT, at the conclusion of the paper, said there was not much for the members to discuss; and as they were about to inspect the inclined retorts at Smethwick, it would be more in order for them to do so, and then, if Mr. Smith would allow them, bring up the paper for discussion at the next meeting.

Mr. SMITH said he had not written the paper for the purpose of raising a discussion, but more as a guide to the members before going to inspect the plant. He had not bothered them with a lot of figures; and what he had stated was what he had found, and what he would advise in the case of anybody starting an installation of inclined retorts.

VOTES OF THANKS.

Mr. BELL said before the members parted, they must express their great admiration for the way in which Mr. Reeves had

performed the duties pertaining to the office of President during the past year. He was an old member, and an old friend of the Association; and some years ago, when they had a difficulty in getting a Secretary, Mr. Reeves came to the rescue. They all knew how well he fulfilled the duties then, and how well he had discharged the duties of President. The Association had prospered under him; and they hoped it would continue to do so.

On the suggestion of the PRESIDENT, the Hon. Secretary and the Treasurer were included in the vote.

Mr. SMITH seconded the motion, which was heartily passed.

The PRESIDENT said he was much obliged to the members for this expression of their approval of the services he had rendered to the Association. He had some misgivings at the commencement of the year as to whether he should satisfactorily discharge the duties. He had, however, received so many expressions of goodwill from the members, and so much kindness, that he had not found the office at all irksome, but on the contrary very agreeable. He had no doubt Mr. Bell would experience the same consideration and cordiality from the members during his year of office; and he would find, as he (the President) had done, that what he had anticipated would be a difficult task would be a very pleasant one.

The HON. SECRETARY also briefly responded for himself and Mr. Simpson.

This concluded the business; and the members immediately afterwards lunched together in the hotel.

INSPECTION OF THE SMETHWICK INCLINED RETORT INSTALLATION—THE NEW COKE-CONVEYOR.

At 2.30, the members proceeded by rail to the Smethwick Gas-Works, for the purpose of inspecting the new inclined retorts at work and the coke-conveyor in course of erection. The installation, it will be remembered, was fully described in the "JOURNAL" for May 16 last (p. 1295); and therefore, with Mr. Smith's additional information (which may be taken as supplementary to the article referred to), it is unnecessary to relate in detail what the visitors saw. Let it at once be said that the good opinion formed of the character of the installation six months ago is confirmed by this further inspection, and by the admiration of the practical men who examined it generally and in detail with critical eye. They saw the furnaces fed direct with the spent charges from the centre retorts, and witnessed the discharging and re-charging of the retorts, all of which operations were carried out smoothly, instantly, and without the slightest fuss. The heats of the retorts and furnaces were examined; and in fact the members went all over the installation from the basement to the coal-conveyor in the roof, and left nothing uninspected. Mr. Smith, patient, earnest, and courteous, was inexhaustible in the information he gave to the members in reply to the numerous questions with which he was plied. An interesting impromptu discussion took place between him and Mr. Paterson as to whether the gas at the upper part of an inclined retort was hotter than that in the lower part; and also as to whether it would not be an advantage to take the gas off from the retorts by means of descension-pipes rather than ascension-pipes. Here are points for experimentalists eager for new fields of research.

At the close of the inspection of the inclined retort plant (the installation of which, with the exception of the retort-house and benches erected by Mr. Thomas Vale, was carried out by Messrs. W. J. Jenkins and Co.), the visitors proceeded to examine the work in progress for the new coke-conveyor, the contract for which is in the hands of the New Conveyor Company, of Smethwick. Calling his friends together, Mr. Smith addressed them on the subject. He said that, owing to the difficulty the contractors had had in getting material for the work, they had been unable to complete the contract in the stipulated time. This being so, he (Mr. Smith) was only able to show the members the work in progress. The hot-coke conveyor was let into the retort-house floor, being 173 feet long from centre to centre of the driving-wheels, and the width of it at the top was 2 feet and at the bottom 15 inches. The trough was 5½ inches deep, and kept filled with water; and angle-iron scrapers were attached to the underside of the conveyor to take away the dust that might fall from the coke. The chain worked on a wearing surface, consisting of pieces of wood, so that it might work noiselessly; and this could be readily replaced if at any time it became worn out. There were sprinklers placed along the retort-house at different points to quench the hot coke as it travelled from the retorts. The speed of the conveyor would be about 30 feet per minute; and it was guaranteed to take away 6 tons every half hour, and the coke to be completely quenched. The return chain ran on rollers fixed to a framework in the cellar. The rollers working in brackets were 6 inches in diameter, and placed 3 feet apart. The coke would fall from the hot-coke conveyor into the elevator-pit, and then be raised by an elevator 47 ft. 3 in. in length, set at an angle of 40°, consisting of 18-inch tray buckets. The overhead conveyor in the yard, upon which the coke was dropped from the elevator, was 192 feet long from centre to centre of driving-wheels, consisting of a 24-inch table conveyor running on 6-inch rollers, 4 feet apart. The whole of the framing and standards was constructed of lattice work; and on the top of the table were placed V-shaped ploughs, to throw off the coke from both sides at one time at set points of the conveyor. The total height of the overhead conveyor was 25 feet; but the coke would drop from this height on to a sloping surface made by the coke—similar to being tipped from barrows. In this way, they obtained storage room for 2400 tons of coke; and as they had to stack last year practically 2000 tons, they had a fair margin. The coke was screened as it came from the retort-house; and it could be loaded direct into boats and taken away. The motive power was obtained from a horizontal engine, of the Waverley type, and of 20-horse power, driven by steam. It had a 14-inch cylinder, and 20-inch stroke. In all probability some of the members would be surprised at the size of the cylinder; but as he could not guarantee more than a maximum of 45 lbs. and a minimum of 35 lbs. of steam, they had to increase the size of the cylinder. The driving was done from a belt to 4-inch shafting placed underground, which was connected to the hot-coke conveyor, and by 3-inch vertical shafting to the head of the elevator, and from there by means of 3-inch shafting placed the whole length of the platform of the overhead conveyor to the driving end of the latter. He could not tell the cost of the coke-conveyor at present; but no doubt the members would like to know what amount it was going to save. So far as he could calculate, it would stack about 2400 tons of coke, and would save in wages from 3d. to 4d. per ton of coal carbonized, and from 6d. to 7d. per ton of coke sold—that was, reckoning upon the amount of coke actually sold last year, and at the present cost of wages. What really induced him to bring the matter before his Committee, and to hasten it forward, was in consequence of the men complaining of the laborious work, and the detrimental effect upon their health of having to wheel the hot steaming coke out into the open in the winter; and therefore they insisted upon being paid more money. Something had to be done; and so the scheme which those present had been inspecting had been adopted.

Before leaving the works, the visitors were very hospitably provided with tea and other refreshments by Mr. Smith. The President took the opportunity of proposing a hearty vote of thanks to him for his care and kindness; and Mr. Paterson seconded. It must have been a gratification to Mr. Smith to hear from the latter gentleman that he had never seen an inclined retort installation that had given him so much satisfaction as had the one he had viewed that day. Mr. Smith, in responding, bore testimony to the great pains the contractors had taken to carry out his instructions. The visitors also desired Mr. Smith to convey their thanks to his Committee for allowing them to visit the new plant.

The return journey to Birmingham was made just before six o'clock; and there the members separated.

THE ANNUAL MEETING OF THE AMERICAN GASLIGHT ASSOCIATION.

The President's Address.

The Twenty-seventh Annual Meeting of the above-named Association was held in New York from the 18th to the 21st inst., under the presidency of Mr. A. C. HUMPHREYS, M.E., M.Inst.C.E., of Messrs. Humphreys and Glasgow. We have received from Mr. Humphreys a copy of his Inaugural Address, which we give below.

In accordance with the requirements of our bye-laws, it now becomes my duty to deliver, and your duty to receive, the President's Annual Address. I shall endeavour to lighten your share in this task by referring only to such subjects as at this time seem to me of pre-eminent importance. What I have to say will be said impersonally, and with a full sense of my responsibility, in view of the fact that for the time I may be considered as your representative and mouthpiece. I appreciate that the custom which has grown up of accepting the President's address without debate increases my responsibility in this connection.

This has been a year of serious happenings for our industry—an increase in the price of American oil; the introduction of an almost revolutionary method of gas production at Boston; the revival, at more than one point, of gas wars; frequent reorganization and recapitalization (sometimes ill-advised in character) of established gas companies; renewed impetus to electric light competition through increased efficiency of electrical apparatus and methods; and the establishment, upon what promises to be a permanent basis, of this Association's scheme for assisting the more ambitious young workers in our ranks to acquire a sufficient education. And all this during a year of unusual national activity and prosperity.

The recent increase in the price of oil has justly occasioned anxiety to gas managers throughout the country. When we consider that not less than 75 per cent. of the illuminating gas manufactured in the United States is water gas, the bulk of which is distributed unmixed with coal gas, and that the American consumption of gas oil, which is the chief item of cost in this kind of gas, exceeds 220,000,000 gallons annually, the serious nature of this question is apparent. In seeking relief from the present oil situation, it is desirable that gas companies should realize their present emancipation from conditions that controlled them in the early days of water-gas manufacture. In those days, the lighter naphthas and distillates were considered essential for satisfactory gas making; and so long as distillates and residual products were the only supplies available, thus long were gas companies dependent on the oil refiners, and on the market

conditions necessary to maintain an equilibrium between their many products—a matter of great complication.

Fortunately the apparatus now in general use is capable of handling the crude oil with maximum economy; and the ability to use this oil advantageously means that gas companies are no longer tied down to the complex conditions of the oil-refining business, but can go direct to the oil-fields for their supplies. Crude oil, freed from water and sediment by the ordinary process of settling, is a gas-making material now quite as easily manipulated, and fully as valuable, as any of the so-called "gas oils." Thus a possible remedy for the present condition is suggested. Let certain gas companies combine to supply themselves with crude oil direct from the oil-fields. To do this effectively, it may be advisable for them to become oil producers. This plan would present difficulties, but I am satisfied they could be overcome. Especially could this remedy be applied in the case of those gas companies operating under a more or less complete system of united management—a form of administration which is on the increase. More immediate, though perhaps less radical, relief will be obtained from a remedy which will be naturally, automatically applied. The present high oil prices have been largely created by gas companies displacing more coal gas with water gas than the conditions warranted, especially in the case of the many large companies distributing water gas exclusively. The pendulum has swung too far; and the present abnormal prices will merely hasten a re-adjustment, in other respects desirable, of the percentages of these two gases.

The joint production of coal gas and water gas creates many collateral advantages which are not realized when water gas is made exclusively. This will lead us to promptly endorse the view, already becoming general in Great Britain, that it is unwise to rely solely upon either coal or oil for raw material. The fact that we have been restricted to the American oilfields, whereas Great Britain is supplied from various sources of oil, furnishes us with an additional motive for joint production. Nor should we forget that coal gas can be made in many places in America at costs as low as are usually recorded in Great Britain. With our larger companies thus making a suitable percentage of coal gas, the smaller companies will generally find it more economical and convenient to manufacture only water gas. Each manager, with the circumstances, local and general, fully in mind, must not only determine for himself the initial proportions of the two gases which will give the best commercial result, but should establish a system of current analysis that will guide him in continually re-adjusting these percentages in accordance with the varying market conditions. In analyzing costs per 1000 cubic feet, the influence of the manufacture of the one gas upon the cost of the other must be correctly determined and apportioned. Some of you may feel that this reminder is unnecessary. From my experience in the critical examination of the accounts of many gas companies, I feel the hint to be well timed. I believe that in but few cases do such accounts present to those interested the true relative costs of the two gases.

The introduction of the coke-oven process into Boston is a matter of possible great importance to our business; and the magnitude of the scheme cannot but command our earnest consideration. Everything which money can achieve has been done to ensure success. The local conditions favour a successful outcome. The process is primarily for the manufacture of coke, which can be made of a quality adapted to metallurgical purposes should a local demand exist (or develop) for such a product. But, in any case, there must be a market for large quantities of this fuel, if the undertaking is to be a success. Boston is favourably situated for the sale of another form of clean fuel than anthracite, which there commands high prices. I am credibly informed that the market for the coke has been already secured; the railroads being the best consumers, in connection with their efforts to give their patrons the advantages of a practically smokeless fuel for their locomotives. With a clean fuel supplementing oiled road-beds, there will likely be in the near future a great increase in the comfort of railway passengers. Besides gas, there are two other main residuals—ammonia and tar. What will be the effect on the market for these products if the output is greatly increased, cannot be foretold; but, in the case of ammonia, I should be inclined to believe that, after reaching a certain lower figure, the development of the demand through such reduced value for agricultural and refrigerating purposes will tend to hold the price at a figure which will afford the necessary return. That the cost of the gas must be small if the coke, tar, and ammonia can be sold at prices to compare favourably with the cost of the coal and its manipulation, goes without saying. The magnitude of a works of this character lends itself to the most economical methods of handling raw material and products. I am not prepared to believe that this process is capable of showing comparative advantages if worked on anything short of a large scale. If my brief presentation of the case is correct, as a gas process it is not adapted to general introduction. From one or other exceptional local conditions, there must be a sure sale for the coke at prices sufficiently high when compared with the cost of the coal. Pittsburgh, as its supply of natural gas becomes exhausted, will afford an example of local conditions most favourable to the process. Judging by the past, we may be prepared to see this process adopted as a weapon by the professional raider; but where such a raid is threatened, it must not be assumed that the process is necessarily adapted to the locality. This question can only be determined by a competent investigation of the local conditions. While thus ready to discriminate, we can well afford to extend a welcome to this robust new-comer.

The past year has seen a revival of gas wars. In some few cases these have been started by the establishment of rival companies. We have not only to deplore this ruinous, inefficient competition, but we have in some cases to deplore the short-sighted policy pursued towards its patrons by the established company who gave the opportunity for a competitor to gain a footing. In the case of the capital of a neighbouring state, this class of management, which, by its narrowness and lack of appreciation of the spirit of the times, invited competition, was found to a degree which I am glad to believe is now most unusual in the United States. We should not be slow to appreciate the lesson here found. Let us be united in our opposition to the invasion of territory of established companies, believing that the peculiar conditions of our business make such competition, as a rule, wasteful both to the companies and to the consumers involved; but let us alone see to it individually that all pretext for competition and raids is avoided by giving to our patrons fair prices, efficient service, and courteous treatment.

The unfortunate gas war now in progress in New York is regrettable from every point of view. We cannot help seeing that the gas business throughout the country is injured when, within a few short months, the New York City Companies first unite in declaring to the State and City Governments and to the public that they cannot maintain themselves on the price of $1 per 1000 cubic feet, and then disunite to offer their product at one-half this price. While it is not within our province to express opinions as to where the blame lies for this condition, we must deeply regret the fact, and hope that the result will make it abundantly evident to legislators and to the public that the gas business cannot be profitably pursued in New York City on the basis 50 c. per 1000 cubic feet of gas, and that this temporary reduction in price was not dictated by legitimate business methods.

About fifteen years ago the practice of re-organizing established gas companies began to develop in America. At first the feeble and badly-equipped companies were taken over, and the purchasers made their profit by operating the properties more efficiently, and taking to themselves a portion of the increased earnings. This resulted in benefit both to the purchaser and to the gas consumer. But more recently there have been not a few cases where the movement has been purely speculative on the part of the purchaser, and over-capitalization has then been the natural result. With the demand for cheap gas, warranted within reason by what has been accomplished by some gas companies, and with the more and more serious competition we are called upon to meet from the electric light, this evil of over-capitalization is to be especially feared. We can so far point with pride to the record made by gas securities—default in interest being almost unknown; but if this evil develops, we may find our securities sharing in the unsavoury reputation made in the financial world by those of many of our railroads.

This brings me naturally to another subject which is one of great importance to us all—our methods of accounting. The object we have in view in keeping general books of account is to determine accurately our profits, and so to provide against the impairment of capital by over-estimation of those profits. This means that, in the multifarious transactions of the year, running from thousands of dollars down to cents, we must carefully distinguish between capital and income, and between investment and operating expense. Every dollar which, through error or design, is credited to income when it should be credited to capital, and every dollar which is charged to investment when it should be charged to operating, simply impairs our capital to that extent. Stated in this plain way, the proposition is self-evident. But apparently it is not so self-evident when overlaid by the intricacies of the daily routine. I am sorry to say that too often, in my professional capacity, I have discovered a startling condition in regard to gas companies' accounts; and so much has this matter been driven home upon my mind in the last five years, that I feel that I should be distinctly at fault if I did not avail myself of this extraordinary occasion to give expression to a definite word of warning.

In the early days of our business, the well-established companies made their money with demoralizing ease. The healthy competition of the electric light was wanting; the only competitor being kerosene oil, and that by no means so cheap or so efficient as it is now. Gas prices were high, and the apparatus and methods employed in works and office were comparatively inefficient. The demand for extension of plant was constant; and the profits were such that these extensions could generally be paid for out of profits, and still leave enough to satisfy the reasonable demands of the stockholders. Under such conditions, it was natural that faulty and inefficient methods of accounting should develop. I have more than once been able to trace the present evident fault to the lax methods developed through the easy circumstances of the past.

In distinguishing between capital and income, we especially have to bear in mind that the portion of our capital invested in perishable plant must be maintained at par by some method which will compensate for depreciation. While this again is self-evident as thus stated, I should be sorry to think it self-evident as ordinarily presented; for I should then be forced to believe

that the methods of accounting sometimes pursued are the result of dishonest design, instead of natural obtuseness developed by the conditions of the business in the past. In the old days, this matter of depreciation was naturally covered by the process I have referred to. The profits invested in extensions and improvements more than covered depreciation. The old plant was finally lost sight of in the improved and extended works; and it would have been generally regarded as an unnecessary refinement to have closely followed in the accounts the progress of depreciation of the original plant. But such a hap-hazard process was only possible under the enervatingly remunerative conditions of the past. How is it now, with efficient competition to face from the electric light, kerosene oil, and perhaps natural gas, and with possibly a portion or all of the re-invested earnings of the past capitalized under some recent scheme of reorganization? As compared with the past, it may now be necessary to pay interest upon a relatively higher capitalization, while a keener competition necessitates the selling of our product at a lower price. It remains, then, not only to conduct our business with a maximum of efficiency, but furthermore to keep such exact and accurate account of income and expenditure that we run no risk of paying dividends not earned. To ensure safety, we must distinguish at every step between repairs or renewals and improvements or extensions; and, further, we must make systematic provision to cover the depreciation which is daily impairing the capital invested in plant.

Permit me for a moment to come closer to details. So important is this matter to all, that I feel warranted in so taking up your time; especially as I have found that there is among us a great failure to agree on this question of depreciation. With many companies, the question does not receive special attention; while others indefinitely depend upon profits re-invested in new plant and extensions to provide for depreciation, without stopping to analyze thoroughly in order to see if, as in the past, there has been a surplus of profits available for the purpose. Others again set aside, in one way or another, a fixed percentage of their profits or of their capital, or of the cost of the plant, assuming that some certain percentage is capable of uniform application.

It seems to me that the nature of the case should suggest the form of remedy. We have to provide for the final renewal of the present plant; but we know that the plant never will, as a whole, have to be finally renewed. Some parts will be renewed from time to time; others will be displaced wholly or in part before the time set for final renewal comes around; and perhaps the manufacturing plant may be entirely rebuilt while yet in good order. We do not have to give much thought to this last case, although great stress is laid upon it by some. If such a complete change is made in advance of the expiration of the life of the plant, in all probability it will be because certain extraordinary conditions have arisen which change the original problem, and show that, on its merits, the plant can or must be rebuilt without regard to past capital investment. For instance, the occupied land becomes so valuable that new land can be purchased where it is cheaper, and more efficient plant built with the proceeds of the sale of original real estate. This is, of course, an extreme case; but it serves as a fair example of the reasons for rebuilding outside of the established scheme for meeting depreciation

To provide a definite scheme to cover depreciation, we must, as accurately as possible, decide upon the average life of the plant in question. I cannot believe that it serves any useful purpose for engineers and accountants to try to determine with any degree of accuracy a percentage of allowance that can be assumed for general application. Each case must be investigated by itself. If we could all first adopt a uniform system of accounting, and then submit to a uniform controlling system of auditing, so that, as a final result, the accounts of all gas companies would be upon a uniform basis, then a uniform percentage allowance could be followed out more fairly. But, even under these theoretical and unattainable conditions, such uniformity of allowance would not be admissible, because of primary differences in the character of the plant. For instance, in some cases the buildings would be of such a flimsy character that it might seem unsafe to assume for them even a life of ten years, and a sinking fund, on a 5 per cent. compound interest basis, to pay off the cost of buildings at the end of ten years, would call for the setting aside of 8 per cent. of their cost each year. Whereas if the buildings were of such a character, as they might well be, as to promise safely a life of fifty years, the sinking fund on the same 5 per cent. basis would require only one-half of 1 per cent. per annum.

It seems plain to me that proper provision cannot be made to cover renewal of plant unless we analyze each case by itself—first examining the plant and establishing the probable life of each principal portion, and then carefully investigating the accounts of the company to determine what provision, if any, is already made, advisedly or otherwise, to meet the renewal of the plant at the end of its life. Such an investigation, in not a few cases, will show that repairs and current renewals are not all charged to operating cost, and that the profits are therefore not so large as claimed. Some striking examples of this unfortunate condition have come under my notice. To estimate a fair average life, it will probably be well to divide the plant under several heads; and these can be again subdivided as indicated by the examination to be desirable—for instance, real estate, buildings, gasholder tanks, gasholders, retort-stacks, retort-settings, condensers, scrubbers, purifiers, station meters, main pipes, service pipes, consumers' meters, &c. Having decided, in the case of each division, what can be safely assumed as the life of this portion of the plant, we can refer to our annuity tables to determine what percentage of the original cost of plant annually set aside at compound interest will, at the end of the period assumed, provide a fund equal to the original cost. Having done this in the case of each item on our list, we can ascertain the total amount to be set aside each year, and then find what percentage this represents of the total original cost of the plant; and this will be the amount to be re-invested, in some safe manner, from the annual profits.

An important point is to determine at what rate we can invest payments to our sinking fund. In these days of low interest-bearing securities, 5 per cent. seems hardly attainable with safety. But if our business is a growing one, as it must be if we are to continue in it long enough to make the question of sinking fund important, there will be the opportunity to invest this fund in legitimate extensions of plant required by increased demands for gas. There should not be the slightest difficulty in thus earning 5 per cent. on this special extension and sinking fund; and, bearing in mind that this new capital has the way prepared for it by the old, the chances are that the new portion will earn a considerably higher rate. We may then assume 5 per cent. as a safe figure. It remains, then, for us to see to it that we pay for extensions each year, out of earnings, an amount equal to the ascertained percentage of cost of the original plant and extensions, and that the accounts are so kept that this fund is separated from the other accounts involved, and that there may be no chance in the future of its being represented—or rather misrepresented—by an additional stock issue. The figure originally taken as the cost of the plant upon which the percentage for the final renewal is taken, will be from year to year increased by the sinking fund amount re-invested in extensions; and so the final renewal of the additional plant built from the sinking fund will be provided for automatically.

The chief difficulty in any such scheme lies in arriving at the life of the individual parts of the plant. As a rule, where the accounts are honestly and intelligently kept, and repairs and current renewals fully charged to operating cost, the percentage allowance is more apt to be too high than too low. It helps me to a better understanding of this most complicated question if there is made a slight change from the usual method of naming the accounts involved. Instead of "repairs," I would use the title "repairs and current renewals;" or, if considered desirable, divide into two accounts "repairs" and "current renewals," carrying both of them, in the final settlement, into profit and loss. For "depreciation" I would prefer the title "final renewal." Thus we have in the title something which has an important bearing upon our analysis of the individual items of plant to determine the average life. The current renewals, if properly made, will result in largely increasing the average life of the plant. Thus some of the items which might be thought to shorten that life, because of their rapid depreciation, would tend to lengthen the average period, since in such items the current renewals are wholly or in part eliminating the question of final renewals. "Retort-settings" is a notable case; and "consumers' meters," one less marked. This point is more markedly observed in the case of electric lighting plant; and it may well serve as a hint that possibly, under present conditions, our electric light competitors have not to provide so much for depreciation as we have sometimes claimed.

Following such a system as I have advised, let us see how we can provide for the final renewal of plant on a 5 per cent. sinking fund basis. Twenty years' average life would require the setting aside out of profits of 3 per cent. of the cost of the original plant and subsequent extensions; twenty-five years' average life, 2·1 per cent.; thirty years' life, 1·5 per cent.; and thirty-five years' life, 1·1 per cent.

It will be noted that the method here advocated follows the lines pursued in past years where the profits were abnormal. The difference is that in the past this course was pursued generally without thought of the question of depreciation or renewal, while with us it must be pursued advisedly, for our consumers can no longer be expected to pay for unlimited extensions of plant, but only so much as will keep our capital unimpaired. This we have a right to require. The lack of uniformity in methods of accounting to which I have just referred, and especially as to repairs and renewals of plant, makes it difficult to accurately compare the cost per 1000 cubic feet of several companies; and still we find questions as to the cost of manufacture discussed as if there were in operation some standard system of account-keeping which permitted such cost-figures to be fairly comparable. Much deception, innocent and otherwise, is possible through this lack of appreciation of the facts.

In opening, I especially referred to the subject of electric light competition as being of serious moment; and I have incidentally alluded to this in connection with other headings. We shall probably all be ready to admit—certainly those will who have kept track of electric light progress—that competition from this source is getting more formidable. The incandescent gas-burner helps us to meet this increasing competition. On the other hand, its great comparative efficiency tends to reduce gas sales in the case of the consumers already on our books. We must look to new customers, and to the natural inclination of all to

use artificial light more liberally as the cost per unit is reduced, for the increase of sales from this source. It can hardly be doubted that this system of gas lighting is destined to be greatly improved and simplified. As sellers of gas, we must welcome such progress, even though we may fear the effect upon our gas sales through the reduction of individual gas bills. Too long have the best minds in our business devoted themselves unsparingly to reducing the cost of gas at the meter; neglecting the equally important question of how to most efficiently use this gas for the benefit of our customers. To reduce the cost of gas by 5 per cent. would be considered by any of us a notable achievement. What should we think of an improvement which enables our customers to get from 1 cubic foot of gas a lighting effect which by the older methods required 3 cubic feet—an improvement of 200 per cent.? And this does not alone apply to the incandescent burner. Too often the managers who are most conscientious and earnest in looking for improvement on the lines of manufacture and distribution are careless as to how the gas is applied after it leaves the meter. The gas manager of the future will, through competition, be forced to see that the gas he has struggled to produce and distribute at the lowest possible cost, is consumed through such appliances as will give the customer the highest attainable result in light and heat.

Competition is necessary; commercial human nature cannot progress without it, The electric light has unquestionably, by its competition, forced us to pursue better methods with respect to both our customers and ourselves. We could derive more consolation from this consideration if our customers—the public and the local and state governments—appreciated the facts; but this is often lost sight of, and a hue-and-cry is raised for gas competition. The general proposition that competition is desirable is quoted against us as if gas and electric light were not for each other completely filling the acknowledged requirements, without bringing competition within our ranks, which, apart from all theorizing, has proved, by most extended and expensive experience, to be wasteful to the consumer, the public, the local government, and the gas company.

Before closing, I wish to say a few words on a subject very close to my heart. Since the last meeting, our correspondence scheme of education has been put firmly upon its feet. You will later hear, by figures, as to the actual progress made. These, however, but imperfectly and coldly set forth the good which is now being done under the direction of the Trustees of the Educational Fund. It is only about three years since we were assured that it would be impossible to carry this plan through. Even a year ago we were many times, in our requests for subscriptions, met by the answer that it was foolish to look for sufficient support to even give the plan a trial; and again and again we had to reply that we had already, through three years of individual effort, proved that the plan was practicable, and well worthy of support. I hope that before long every one of the Gas Associations of America will come into line, and aid in this work. They can well afford to co-operate in the plan established, which has purposely been made broad enough and independent enough for all. I feel sure that the want of enthusiasm which has been noticeable in certain quarters is really due to lack of information, and therefore lack of appreciation of the scope and progress of the Trustees' work. I have often been encouraged to find that a more complete understanding of the work led to greater interest, and in some cases even to enthusiasm. I trust that any of you who have obtained your education by extraordinary personal effort will be led to look into this matter more appreciatively.

I have been informed that some of our technically educated men regard this scheme with suspicion; the idea, as I understand it, being that technical work should be reserved for college men. Remembering how thoroughly the scheme has been supported by the majority of our technically educated members, we can perhaps afford to ignore such opposition from a narrow minority. When we bear in mind the thousands upon thousands who have received, and are now receiving, sound general education through the ordinary correspondence schools, we may well ask: Why should not we succeed in this special case with the requirements of which we are so familiar? The day will come, if it has not already come, when the American Gaslight Association, with its splendid record, can afford to point to the establishment of this scheme of education as a sufficient warrant for its existence.

I have not thought it desirable to occupy your time while I reminded you of the encouraging developments in our business during the past year. It seems to me more important that we should consider the opportunities for further progress. Our country has been enjoying a year of extraordinary commercial prosperity; and while our business has not perhaps had its full share in this increase in profits, owing to the fact that our raw materials and supplies have increased in cost while our product is sold at the old rates, still we may be consoled by the reflection that the stability of our business is thus again demonstrated; for if it is true that in times like the present our profits do not show a proportionate increase, it is likewise true that in times of commercial depression we do not experience a proportionate falling off in profits.

The address closed with a brief reference to the members of the Association who had been removed by death since the previous meeting, and with an appeal to those still filling its ranks to assist in its work by the preparation of papers and participation in the discussions.

THE BANDSEPT INCANDESCENT BURNER.

Reference has been made from time to time in the "JOURNAL" to the burner devised by M. Bandsept, of Brussels, for use with the incandescent system of gas lighting; and the several improvements effected therein by him have been duly recorded in our "Register of Patents." The special feature of the burner, it may be remembered, is that its construction ensures such an exact proportioning and atomization of the mixture of gas and air as to produce uniformity of temperature in the portion of the flame in which combustion is active; and it is claimed that under such conditions the mantle employed not only yields its maximum illuminating power, but lasts longer from the circumstance that it is not subject to the varying effects of incomplete combustion, influenced by outside disturbances. The air, drawn into the burner at various heights, passes between two or more superposed conical tuyeres fixed at different inclinations. During its passage, its motion is accelerated; and it enters with force into the jet of gas, and becomes intimately mingled with it on the mixture reaching the flame. The burners are of two kinds—one producing a full and the other a hollow flame. But with both the flame is stable, and readily assumes the shape of the mantle, whether long and cylindrical or short and conical; and consequently a regulator is not required so long as the pressure does not vary to a very great extent. The burner may be adjusted to any pressure. When this is above 20-10ths, considerable increase in the illuminating power of the mantle may be obtained by augmenting the supply of gas in certain proportions. On the other hand, with pressures below 16 10ths the output of gas must be reduced proportionately to the pressure. The burners are made in three sizes, to consume 3½, 5, and 10½ cubic feet of gas per hour—the lighting power being 90, 125, and 250 candles respectively; and they may be used with or without a chimney. The latter plan is preferred in France and this country. The accompanying illustration shows a 10½-feet burner fixed in a tulip-shaped shade. When employed for public lighting, the burners are placed in lanterns fitted at the top with a series of cones or tuyeres, which cause an up-draught by syphon action. The appliance is thereby enabled the better to resist the action of wind and rain. It will probably be remembered that Professor Vivian B. Lewes spoke very highly of the Bandsept burner; and the following results of trials seem to justify the good opinion formed of its capabilities by that high authority—the figures prefixed by (*a*) referring to the full-flame burner, those marked (*b*) to the hollow-flame burner:—

Small Burners (with Chimney), with Belgian Mantle and Brussels Gas.

Consumption. Litres.		Illum. Power. Carcels.		Litres per Carcel.
(*a*) 99	..	8·53	..	11·5
(*b*) 120	..	9·84	..	12·8

Similar Burner and Chimney, with English Mantle and London Gas.

Consumption. Cub. Ft.		Illum. Power. Candles.		Candles per Cubic Foot.
(*b*) 6·0	..	150	..	25
(*b*) 5·8	..	140	..	24

Larger Burner (without Chimney), with French Mantle and Paris Gas.

Consumption. Litres.		Illum. Power. Carcels.		Litres per Carcel.
193	..	8·10	..	12·7
180	..	15·00	..	12·0
310	..	25·00	..	12·0

Cluster of Burners, with English Mantles and London Gas.

Consumption. Cub. Ft.		Illum. Power. Candles.		Candles per Cubic Foot.
24	..	550	..	23

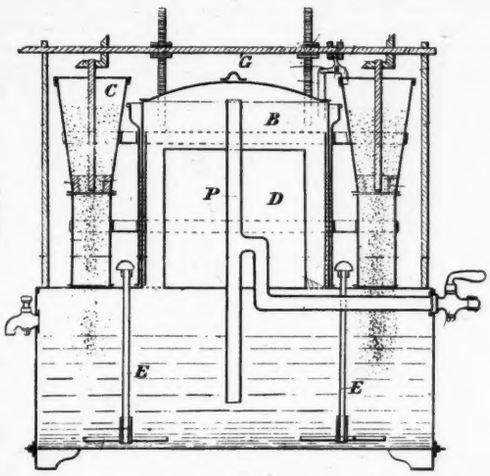
If economy in the use of gas is the chief object sought, the small burner, the length of which is about that of an ordinary bunsen, will be found suitable; but where great luminous intensity is desired, the larger burner is preferable.

Gauging Cement with Salt Water.—According to tests recently made by Mr. A. S. Cooper, and described by him in the current issue of the "Journal of the Franklin Institute," the use of salt or sea water in gauging cement is bad practice. The tests were made with both natural and portland cement motars, and comprised tensile and compressive tests. The ages of the briquettes when tested were one week, four weeks, three months, six months, and one year. In the short-time tests, the briquettes gauged with salt water stood ahead of those gauged with fresh water; but the long-time tests nearly always showed the superior strength of the briquettes mixed with fresh water. This was just as pronounced in the compression as in the tension tests. The deteriorating effect of the salt water seemed to be the greatest with the richer mortars.

REGISTER OF PATENTS.

Acetylene Generator.—Drivet, H., of City Road, and Bilbie, J., of Queen Victoria Street, E.C. No. 17,734; Aug. 17, 1898.

This generator (as shown) consists of a water-tank provided with a water discharge-pipe to the left and a gas supply-pipe to the right, and carrying a central gasholder B and two carbide of calcium receptacles or distributors C, one on each side, and furnished with scrapers or rakes consisting of a hollow central stem or pipe E, carrying at its lower end a number of radiating blades or paddles. The carbide receptacles are preferably the shape of a truncated cone, the inner periphery of the small and lowermost base of which is provided with teeth operating in

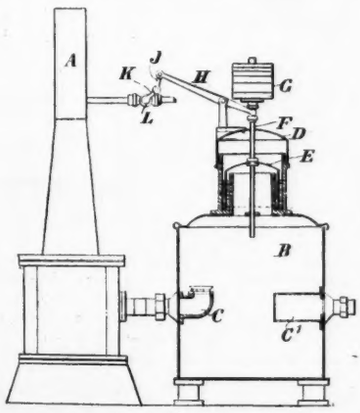


conjunction with a conical wheel mounted on the lower end of a vertical shaft, as in a coffee-mill. The upper end of the shaft carries a friction cone or bevel wheel, gearing with a similar wheel mounted on the horizontal shaft G, resting freely on the two forked bearings or standards in such a manner as to be capable of sliding to and fro thereon. Upon the shaft G are keyed two rollers, provided with teeth gearing with those of two racks mounted on the top and at each side of the holder which carries a rod jointed to a bell-crank lever secured to the outer periphery of the carbide receptacle. P is the central gas-pipe connected to the supply-pipe leading to a purifier filled with coke or other suitable material. D is a drum intended to fill up a portion of the capacity of the gasholder.

The receptacles C being partly filled with carbide in powder, when the bell B descends, on account of the withdrawal of the gas, the shaft G is rotated, giving rotary motion to the vertical shaft by the friction cone or bevel wheels shown, whereupon the coffee-mill mechanism in the receptacles grinds and distributes the carbide, which falls in the water of the tank, and generates acetylene. This gas accumulates in the bell B, and causes the latter to ascend and to shift, by the aid of the bell-crank lever, the shaft G towards the right-hand side; and thus disconnect the friction cones or bevel wheels, and arrest the distribution of the carbide.

The Compressing of Gases.—Sugg, W. T., of Westminster. No. 21,144; Oct. 7, 1898.

This apparatus was designed "in order to give the pressure of gas necessary to ensure the best results in incandescent gas lighting." In such apparatus a cut-off device is necessary to stop the working of the motor when the pressure of the gas exceeds a certain amount—as, for instance, when some or all of the lights are turned out; and this invention consists of a mercury-sealed appliance operated by the pressure of the gas, and connected by suitable mechanism with the device governing the supply of power to the motor, so that, as the appliance rises and falls according to the pressure, the governing device is turned off or on as required.



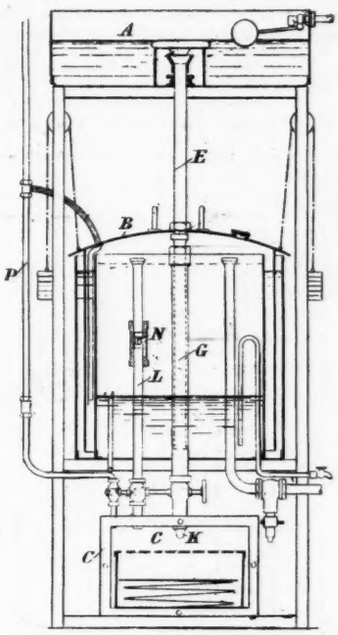
A shows the position of the forcing mechanism, consisting of a water-motor and a suitable pump. B is a receiver into which the gas is forced—the inlet-pipe C being provided with a mushroom or other valve to prevent back-pressure on the pump; while the outlet C^1 is covered with fine perforated zinc or other material. At top the receiver is open to a casing D, in which is contained a small mercury-sealed bell E, provided with a guiding stem or spindle F, which projects upwards through the top of the casing, and carries a platform for weights G. The stem is also pivoted to the short arm of the lever H, the longer arm of which is connected by a link J with the lever or handle K of the water cock L.

So long as the whole of the lights in an installation are burning, the gas passes through the receiver without acting on the bell E. But directly any lights are turned out, the pressure in the receiver increases; and when it exceeds a certain amount (fixed by the weights G) the bell E rises, and acts on the lever H, so as to cut off the supply of water to the motor. The motor will thus stop; and consequently the pump will stop, and the pressure remain stationary. When any lights are turned on, the bell E gradually descends under the influence of the weights G, and thus automatically turns on the power to the motor, which recommences work.

Generating Acetylene.—Van Praag, D. J., of Hampstead Road, and Harker, W., of Maidenhead. No. 21,691; Oct. 14, 1898.

This invention relates to the class of apparatus in which water is brought into contact with calcium carbide, or other carbide, for the production of acetylene.

A is a reservoir in which the water-level is kept constant by means of a ball-float controlling the valve on the main supply-pipe; B is the gas-holder provided with the usual water-seal; and C is the gas-generator. The reservoir is provided with a stuffing-box, through which slides a tube E



attached gas-tight to the top of the gasholder bell. The tube is prolonged through the bell, and slides in a vertical tube G fixed to the base of the holder. The upper part of E is open to the water in the cistern, and is surrounded by a perforated cylinder, upon which rests a weighted cap provided with a projecting piece, which acts as a centering device for the cap on the mouth of the pipe E. When the bell B becomes filled with gas, it rises, and, carrying with it the tube E, lifts the weighted cap from its support, and prevents any further supply of water to the carbide or escape of gas from the holder. The tube L, provided with a stop-valve and non-return valve N, conveys the gas to the holder. P is a tube which puts the generator in communication with the atmosphere. It is also in communication with the water-seal of the holder through a flexible tube, so that, in the event of the pressure rising too high, the excess of gas can escape to the atmosphere. The carbide receptacle, which is placed inside a casing C, consists of a cylindrical vessel (preferably perforated) provided with a removable perforated top fixed by a bayonet joint to the casing. The carbide is placed between the top and an unperforated disc, which rests upon a spring serving to keep the carbide in contact with the moist pad of lime which forms under the perforated top on to which the water drips from the nozzle K.

Manufacture of Producer Gas.—Lake, H. H.; a communication from F. L. Slocum, of Pittsburgh, U.S.A. No. 22,020; Oct. 19, 1898.

The object of this invention is to provide for the recovery of the bye-products from the greater portion of the fuel used in the generation of the gas, and at the same time to "so bring up the efficiency of this class of gases after the separation of the bye-products therefrom as to raise the gas to a high-quality gas—that is, one which has such a high percentage of combustible that it will burn without reheating."

The invention (which is illustrated by the patentee in his specification in connection with the Mond system of gas manufacture) consists in first generating gas from a body of carbon, then separating the bye-products therefrom, and then passing the gas through a body of incandescent carbon to break up the steam or water vapour taken up by the gas in connection with the separation of the bye-products therefrom, and to reduce the carbonic acid of the gas to carbonic oxide. It is claimed that, when the invention is applied to a Mond producer, its efficiency is doubled and a gas is made of high heating power, much richer in hydrogen, and having the non-combustibles reduced from about 60 per cent. of the gas to less than one-fourth thereof, while the percentage of carbonic oxide is quadrupled.

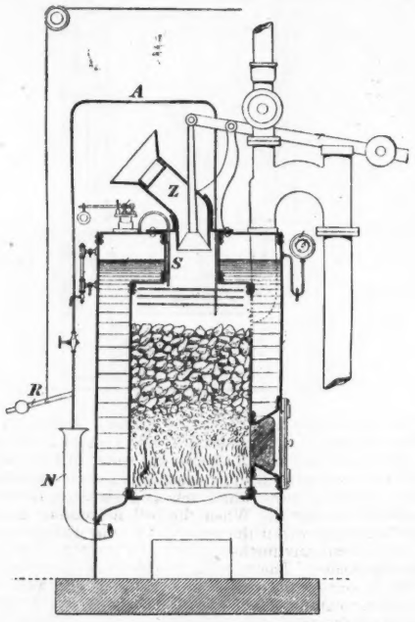
Producing Gas from Town Refuse.—Pilous, E., Ottermann, G., and Nauheim, E., of Vienna. No. 25,209; Nov. 29, 1898.

The patentees describe a method of producing gas composed essentially of hydrogen and methane, by distilling refuse, street sweepings, ashpit refuse, and like organic substances, at temperatures of between 800° to 1000° C.; the gases produced being constantly removed over the heated material. Then the residue remaining from this dry distillation is used immediately on the completion of the latter for the production of water gas; the temperature of the residue serving for initiating and carrying on the formation of the water gas. The quantity of water added thereto is regulated in such a way that the steam produced can come into reaction with the still-sufficiently-heated residue. A modification of the process consists in making the hot residue from the distillation encounter steam; and the gaseous mixture produced is conveyed through the still hot retorts, so as to cause a further production of water gas. The apparatus for carrying out the process consists of a series of two inter-connected retorts, each of which opens below in a shaft, into which the distillation residue comes, and is mixed with water by means of pipes provided with openings so arranged that the residue, after the formation of steam from the water, still possesses a somewhat high temperature, in order to allow of the chemical action of the steam on the carburet-containing residue.

Manufacture of Water Gas.—Boult, A. J.; a communication from G. Nicolini, of Rome. No. 25,277; Nov. 30, 1898.

This invention relates to water-gas apparatus in which the heat of the wall of the combustion chamber is utilized to generate steam at a suitable pressure—say, exceeding three atmospheres; the usual refractory brickwork being replaced by a metallic double-walled chamber forming a full space and water-jacket, the object of which is "to do away, in water-gas generating works, with the small steam-generator which has been necessary hitherto for the production of the steam for injecting into the generator."

In the generator shown, A is the pipe for conducting steam from the dome to the injector N; and S is a pipe coiled in the interior of the generator through which the steam from the dome passes in order to be superheated. R is a balance-weight lever, operated by the gasholder bell,



for regulating the admission of steam to the nozzle. By doing away with the steam-generator, no injector for dry steam will be required to start the generator and keep it going. As soon as the steam in the water-jacket has attained a pressure of (say) three atmospheres, the lower door is closed with a plug of refractory material; and, the generator being thus started, regular working is attained by opening the cock of the steam-pipe, whereby the steam and air required for the production of water gas will be injected through N; the fuel being continuously supplied through the inlet Z at the top.

The incandescent fuel has in this invention the double function of producing water gas which passes to the gasholder through a purifier, and of evaporating the water comprised between the two walls of the generator, until the steam has attained the necessary pressure to enable it to be injected under the fire-grate, mixed with dry air from the heating chamber. It is therefore obvious that the jacket of the generator fulfils the function of a steam-generator, and renders unnecessary the installation of a special generator as hitherto usual.

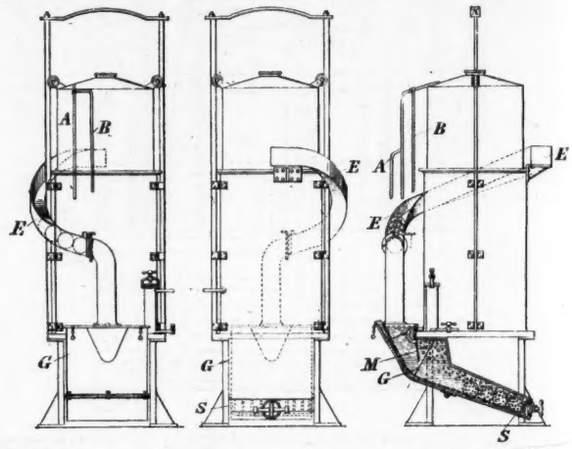
Separating or Producing Hydrocyanic Acid from Gases containing such Acid or Cyanogen.—Bueb, J., of Dessau, Germany. No. 26,259; Dec. 12, 1898.

This invention relates to the production of hydrocyanic acid from gases (other than coal gas) containing cyanogen—such, for example, as the gases obtained by the dry distillation of molasses, or residues resulting from sugar making. The invention is also applicable to the separation of synthetically formed hydrocyanic acid from other gases combined therewith. In dealing with such gases, various difficulties have hitherto been encountered—more particularly in effecting its separation from carbonic acid. Hitherto it has been necessary, in order to extract hydrocyanic acid from the gases, to adopt the same course as that which has to be followed in obtaining cyanogen from coal gas; the cyanogen being first separated in the form of a double ferro-cyanogen salt, and then converted into the required alkaline compound of cyanogen. The present invention supersedes this indirect method by providing a process permitting the gases to be freed from their hydrocyanic acid direct, which acid is then, when required, converted into the alkaline compound by another direct operation.

Generating Acetylene.—Saule, P. C., of Tulle, France. No. 10,862; May 24, 1899.

This invention relates to an acetylene generator having an inclined shoot for the supply of carbide, a device for regulating the supply, and a specially constructed generating vessel.

The illustration shows a front view, rear view, and the apparatus in partial section.

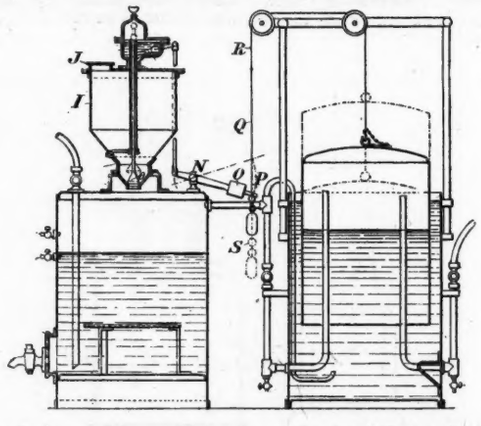


The gas-generating vessel G, is shaped like a bent or inclined tube or funnel, and can be turned round on a pivot for the purpose of cleaning it with ease; the upper opening of the generator being below a carbide-shoot. In the shoot E, arranged preferably as a spiral around the gas-bell, are placed balls or blocks of carbide or hollow metal balls, which can be opened, and the exterior of which is perforated. A fork A, fixed to the bell, enters, at the average height of the bell, between the ball which is next to the outlet and the next one; while when the bell sinks still lower, a rod P will disengage the catch which closes the outlet, and thereby allow the first ball to enter the gas-generator—the fork A keeping back the other balls in such a way that only one ball at a time can enter the generator partly filled with water. The gas as generated passes up into the bell behind the guide-plate M, and below the covering plate, through the connecting tube above. In order to withdraw the balls from the water in case of a too rapid generation of gas, a rake S having several teeth or bars is provided in the generator, which can be actuated by means of a chain and drawn towards the upper end of the generator.

Generating Acetylene.—Quelle, E., of Paris. No. 14,240; July 10, 1899. Date claimed under International Convention, Dec. 21, 1898.

This invention has for its main object to render the use of a stuffing-box in acetylene generators free from danger of any escape of gas by maintaining a bath of oil at the back of the box, on which the pressure of gas is exerted.

In the generator to which this principle is applied, the shaft which passes through the stuffing-box is employed to transmit the motion of a gasholder bell from the exterior to the interior of the apparatus, to actuate the valve of the carbide distributor. The generator consists of a cylinder hermetically closed and filled with water to a predetermined level. Above



is placed a hopper I for containing the powdered carbide introduced at J. The lower portion of the conical hopper is riveted to a collar terminating in a small cone, which has at its apex an orifice closed by the valve opening out into the main cylinder. Above the hopper is fixed the oil-box previously referred to, and which allows communication with the exterior. Upon the cylinder is attached a lever N, one arm of which carries a counterweight O for keeping the cone-valve closed. It is upon this lever-arm that the gasholder bell acts. A ring P is fixed to the

counterweight O; and through this ring passes a rod Q suspended to the chain R attached to the holder bell. The rod Q terminates in a ball S of greater diameter than the ring; and a counterweight T attached below keeps the chain in tension.

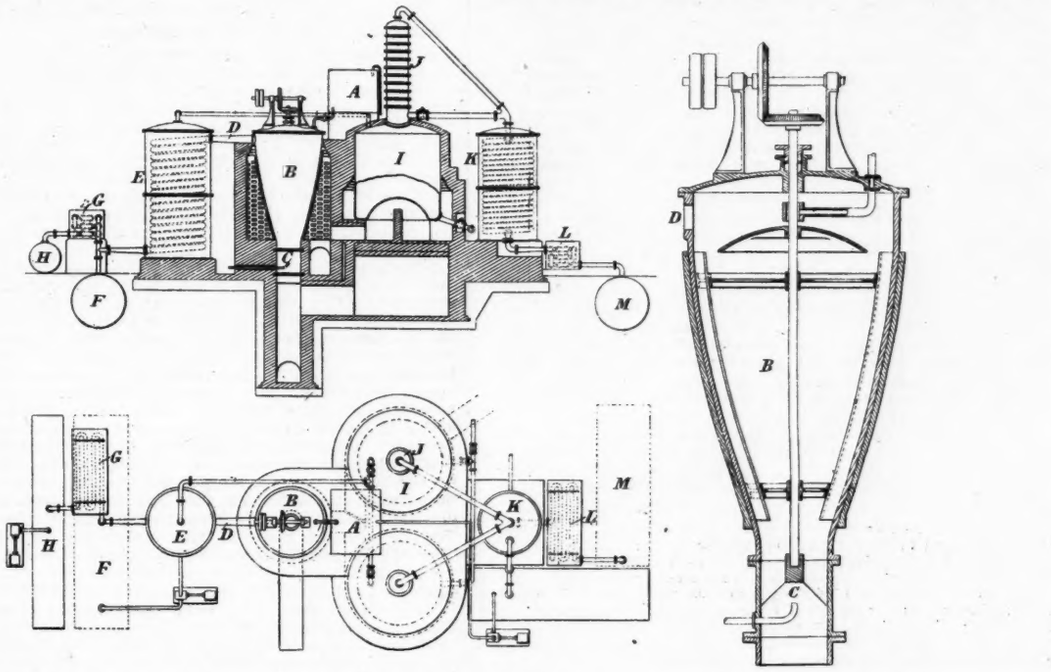
When the bell descends and reaches nearly to the end of its travel, the ball rises and comes against the ring. The movement continuing, the long arm of the lever N is raised, and the movement is transmitted to the cone-valve by the short arm of N. The valve is consequently raised and a quantity of carbide falls into the water in the generator. Acetylene is immediately generated, and causes the bell to rise. The lever N being left to itself, the counterweight O brings the system of levers back into their original positions, and the valve is again shut; and this to-and-fro movement is continued without cessation as long as the gas is utilized and carbide remains in the hopper.

Separating Free Carbon from Tar.—Lennard, F., of Gracechurch Street, E.C. No. 2183; Jan. 31, 1899.

Tar, and especially coal-gas tar, the patentee remarks, contains free carbon, which retards the distillation of the tar, causes undue wear and tear of the distilling apparatus, and reduces the value (for agglomerating purposes) of the pitch produced from distillation of the tar. Consequently, the present invention has for its object "to separate the free carbon from the tar so as to increase the value of the pitch produced when the tar is distilled, and to obtain the free carbon in a valuable form for electrical and other purposes."

The proposal is to dilute the tar from which the carbon is to be separated with naphtha, light oil, or any other suitable oil or spirit of low specific gravity, to such an extent as to neutralize the viscous nature of the tar and produce a mixture having an appreciably lower distilling point than the tar alone has. Having so diluted the tar, the mixture is passed into a chamber or retort, externally heated to the volatilizing point of the mixture; and it is subjected to the action of steam, which has the effect of depriving it of practically all its liquid portion—the free carbon being deposited in the form of a rough powder.

The chamber or retort in which the mixture is so treated is preferably of somewhat conical form—smaller at bottom than at top. The mixture of tar and oil or spirit of low specific gravity is supplied from a tank A (provided with an agitator) to the chamber or retort B, heated by a furnace, and provided with a rotating scraper and a spreader. C is a pipe and jet, by which steam is admitted and projected upwards from the lower part of the retort B, the bottom of which is provided with a water-well (constituting a seal), into which the carbon falls, and from which it can be removed as required. The volatile products driven off from the retort pass away by the pipe D, and through the coil of the interchanger and condenser E, from which the condensed portion passes into the receiver F; the uncondensed portion passing through the coil in the auxiliary condenser G, and thence to the receiver H. It can be used for mixing with a further quantity of tar. The products from the receiver pass outside the coil in the interchanger and condenser on to a still I, which can be heated by the hot products of combustion from the furnace which heats the retort. The first or lighter products of distillation from this

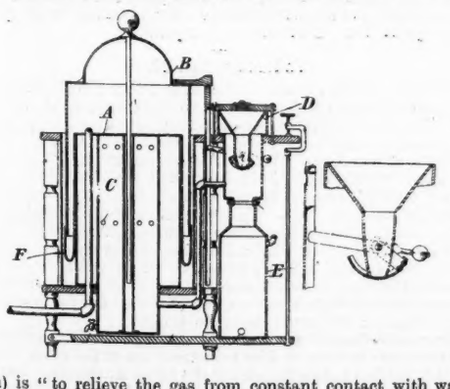


still are passed through the fractionating column J; then through the coil in the interchanger K; and thence through the condenser L into the receiver M. The heavier or last portions of distillation from the still afterwards pass through the interchanger and condenser into a receiver. The residue left in the still is withdrawn for use, or for further treatment if required.

The condensing medium for the interchanger K can be the products of distillation from the retort B, as in the case of the interchanger E; or water or other condensing agent may be used in either or both of them.

Producing and Storing Acetylene.—Bridges, C. M., of San Francisco. No. 14,984; July 20, 1899.

The prime object of the device (besides providing means for generating and holding the gas, and making its production automatic with the consumption) is "to relieve the gas from constant contact with water by providing a novel dry seal, and thereby improve its quality and illuminating properties."



The plant (as shown) consists of an open-top cylindrical vessel, within which is the closed-top cylinder A. Interposed between the cylinders is the bell gas-reservoir B. Within the cylinder A is the central small cylinder C, closed at both ends, and having its vertical wall perforated to communicate with the interior of A; the latter being perforated at top to communicate with B. The carbide holder D is above a reservoir E.

Assuming that the reservoir contains water, as the carbide drops into the reservoir, gas will be generated, and flow into the cylinder C, where it is relieved of moisture, and subsequently enters the cylinder A, and finally flows through the perforations to the bell B. As the gas increases in volume, the bell is forced upward, and a rubber sleeve or hood F between the vessels closes the connection.

APPLICATIONS FOR LETTERS PATENT.

20,689.—Smith, F. W., "Automatically extinguishing gas-lights." Oct. 16.

20,690.—Wilkinson, J., "Manufacture of an improved gas for obtaining light, heat, and power." Oct. 16.

20,753.—Biheller, S., "Globes for use with incandescent gas-lights." Oct. 17.

20,773.—Mühlenthal, S., Löwenthal, M., and Hahn, T., "Pressure regulator." Oct. 17.

20,792.—Irwin, W., "Carburetting gas." Oct. 17.

20,793.—Richardson, J., and Highton, F. S., "Regulating the speed of gas-engines." Oct. 17.

20,884.—Trendel, F., "Solid igniting bodies for automatic gas-igniters." Oct. 18.

20,924.—Dale, J. H., and Bushell, W. H., "Heating by gas and air." Oct. 19.

21,035.—Kellner, C., "Manufacture of acetylene." Oct. 20.

21,042.—Billing, A. J., "Gas-burners or rings for heating and cooking purposes." Oct. 21.

21,050.—Bellamy, A. R., "Gas and oil motors." Oct. 21.

21,086.—Noël, P., "Gas-burner for heating and lighting by incandescence." Oct. 21.

21,089.—Heiner, G., "Burners and apparatus for cooking and heating." Oct. 21.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Workmen's Compensation Act—The Case of Main-Layers.

With further reference to the case of *Bennett v. Aird and Sons*, reported in our issue of the 17th inst., and commented upon last week, the correspondent, with whose opinion upon the effect of the judgment in that case we expressed disagreement, writes as follows:—

The conclusion I drew from Judge Stonor's decision in *Bennett v. Aird and Sons* may have been expressed in an off-hand manner, but it was not, as you suggest, arrived at without due consideration. The question of whether the men employed in the distribution department of a gas company are excluded from the operation of the Act came before me in the ordinary course of my duty some months ago; and Judge Stonor's ruling only confirmed the opinion at which I then arrived after careful consideration of the bearing of the Act. That conclusion was that by no probable line of reasoning, by the most subtle of legal minds, could men employed "on the district," as distinguished from "on the works," be brought within the meaning of the Act, unless they were employed upon "engineering work" as defined in section 7. Looking to that definition of "engineering work," and to the meaning ascribed to "other mechanical power" by authoritative legal writers (Redgrave's "Factory Acts," 7th ed., p. 130; Willis's "Workmen's Compensation Act," 5th ed., p. 59), it did not appear to me that the mechanical appliances used in main or service laying came within that definition. That opinion is confirmed by *Bennett v. Aird and Sons*. According to the full report of the case since published in the "Law Times," his Honour, in giving judgment, said: "The only words in the Workmen's Compensation Act, 1897, sec. 7 (1), which can include it [the case] are 'engineering work,' as defined by the same section (2)"; and he held that the mechanical appliance which it was contended by the applicant constituted the job an "engineering work"—viz., a pulley and chain suspended on shears used for lowering the pipes, not the "beetle and wedge"—was not "mechanical power" within the meaning of the Act.

But, you say, may not work on a main which is physically connected with a factory be held to be work "about" that factory? Well, evidently, such an argument did not occur to the "subtle" mind of Judge Stonor, for he further said, in the course of his judgment, "that the laying of pipes for water, gas, or any other purpose was *ejusdem generis* with works for the construction, alteration, or repair of a 'sewer,' and that, so far, the case [of *Bennett v. Aird and Sons*] was within the Act;" but that it, and, therefore, any other case *ejusdem generis* therewith, only came within the Act if the remaining words of the section, as to the use of machinery upon the work, also applied thereto. He is, therefore, it will be seen, of opinion that "the only words" in the Act which could apply to gas-main laying are "engineering work."

You, out-lawyering the lawyers, suggest that it might be argued that a gas-main is a factory within the meaning of the Act, because it is physically connected with a factory. In passing, are not stoves and other fittings in the district physically connected with the works? Now, the definition of a factory that appears to bring a gas-works within the Act is:

> Any premises wherein, or within the close or curtilage or precincts of which, any manual labour is exercised by way of trade or for purposes of gain, in or incidental to the following purposes, or any of them, and wherein, or within the close or curtilage or precincts of which, steam, water, or other mechanical power is used in aid of the manufacturing process carried on there; namely, (*a*) in or incidental to the making of any article or part of any article; (*b*) in or incidental to the altering, repairing, ornamenting, or finishing of any article; (*c*) in or incidental to the adapting for sale of any article.—(Factory and Workshops Act, 1878, sec. 93.)

By the same section of the same Act, it is provided that "if a place which is situate within the close, curtilage, or precincts forming a factory is solely used for some purpose other than the manufacturing process or handicraft carried on in the factory, such place is not to be deemed to form part of the factory, unless it is of itself a factory."

Now, can it seriously be suggested that a gas-main (or even the gas-holder with which it is connected) is a "factory," or part of a "factory," within this definition? That is the question; because, in order that it may be argued that work about a main is work "about" a factory, it must be shown either that the main is a factory itself, or is part of a factory—the preposition "about" meaning, and having been held to mean, round or near to.

As to a main being a "factory" itself, the question needs only to be stated for its absurdity to become apparent. It would be as sensible to argue that a wagon conveying paper from a paper-mill was a factory (*i.e.*, "any premises in which the manufacture of paper is carried on") as to argue that a main conveying gas from a gas-works was a gas factory. But, you will say, the main is physically connected with the works, the wagon is not. Certainly; but, seeing that a place actually situated within the precincts of a factory is not, *de facto*, a part of that factory, physical connection between two places, one a factory, the other not, does not appear sufficient to render the second place a factory, or even part of a factory. Moreover, factories are defined to be "premises within a close or curtilage." What is the close or curtilage of a gas-works if it includes the distributing mains? The very difference in nomenclature—"manufacture" up to the holder, "distribution" from the holder—distinguishes the works or factory from the mains or conveying plant. You distinguish a main conveying water from storage from a main connected with pumping works. Supposing an accident occurred on a main carrying gas from both a holder station and the works at the same time; how would you classify your main?

It is, of course, open to suggestion that, by some extraordinary perversion of the phrase "on, or in, or about" from its reasonable and probable meaning, the administrators of the law may bring the distribution staff of a gas company within the scope of the Workmen's Compensation Act; for it is undoubtedly the case that anything may be argued to be possible that has not been actually proved to be impossible. But is that the common-sense line to take in regard to one's liabilities? To cast about for the most unlikely interpretation of an Act, in order to find an excuse for assuming its liabilities? Surely it is unnecessary to anticipate and act upon an interpretation of the section in point which can, I contend, only be brought within the range of probability by assuming a judgment contrary to common sense.

I am sorry to have occupied so much space in defending an opinion which, being based upon previous consideration of the question, I expressed perhaps somewhat dogmatically; but I have thought it right to attempt, at any rate, to make good my contention, because the point is of greater importance to gas companies than your advice to pay up without question would lead one to suppose. An accident whereby four main-layers were killed by the explosion of a main due to the carelessness of one of their number, would, were the accident dealt with as one occurring in an employment within the meaning of the Workmen's Compensation Act, cost the employing company somewhere about £1000. Under the Employers' Liability Act, nothing. Do you advise the payment of the £1000 without question raised?

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

Wednesday, Oct. 25.

(*Before Mr. Justice* RIDLEY *and Mr. Justice* DARLING, *sitting as a Divisional Court.*)

Uckfield Rural District Council v. Crowborough District Water Company.

Mr. MOORE appeared for the District Council; Mr. WHATELEY and Mr. BOXALL represented the Water Company.

Mr. MOORE said this was a case stated by Justices of the Petty Sessional Division of Uckfield, Sussex, to obtain the decision of the High Court as to whether they were right in dismissing two informations which had been laid at the instance of the Uckfield Rural District Council against the Crowborough District Water Company. The short point was whether the Special Act of Parliament under which the Crowborough District Water Company were incorporated had the effect of relieving them from the necessity of complying with the bye-laws of the Rural District Council, for the breach of which they sought to convict the Company. The appellants contended there was nothing whatever contained in the Special Act which relieved the Company from the necessity of complying with the bye-laws, which were imposed in pursuance of the Public Health Act, and therefore passed into general law. The matter was one of considerable importance, because, if the contention of the Company was correct, in proceeding with the erection of a building they were absolutely relieved from all control and supervision whatever from the Local Authority. The appellants were a Rural Authority who had obtained, under various Acts of Parliament, powers conferred on Urban Sanitary Authorities by section 157 of the Public Health Act of 1875. As a good deal would turn on the actual words, he would refer their Lordships to the section, which said: "Every Urban Authority may make bye-laws with respect to the following matters." Sub-section 2, which was the important one, continued: "With respect to the structure of walls, foundations, roofs, and chimneys of new buildings, for securing stability and the prevention of fires, and for purposes of health. And they may further provide for the observance of such bye-laws by enacting therein such provisions as they think necessary as to the giving of notices, as to the deposit of plans and sections by persons intending to lay out streets or to construct buildings, as to inspection by the Urban Authority and as to the power of such authority (subject to the provisions of the Act) to remove, alter, or pull down any work begun or done in contravention of such bye-laws." Then came the final proviso, to which he specially drew attention, which said that Railway Companies alone were specially mentioned as being exempted from the necessity of complying with the bye-laws.

Justice DARLING: In what way did they violate the bye-law?

Mr. MOORE: They did not give notice of their intention to commence the building, and did not deposit the plans and sections showing the nature of the building to be erected.

Justice RIDLEY: They acted as if they were independent altogether. They relied on their Special Act. It is not that you complain of their building, but you say they are subject to supervision by the Council.

Mr. WHATELEY said there was also another point—whether there were any particular bye-laws which applied to this case.

Mr. MOORE intimated that he should have to call attention to the particular bye-laws.

Justice DARLING: You are not complaining that they did not build of a certain thickness or height, but that they broke the bye-law which required them to deposit plans?

Mr. MOORE said that was so. The Company did not give the Council an opportunity of seeing whether they were going to transgress any of the bye-laws, and did not intimate whether they intended to comply with their own Special Act. This was another point.

Thursday, Oct. 26.

Mr. WHATELEY, for the Company, submitted that the Council had no power to make bye-laws which referred to the Company, on account of the dates of the various Acts; and even assuming they had power, they did not purport to have done so. The question turned a great deal on the dates of the Acts. The Special Act under which the Company were incorporated was dated July, 1897; and the bye-laws by which it was said the Company were bound were allowed by the Local Government Board in January, 1897. They were made under the Public Health Act, 1875. Many of the bye-laws were quite inconsistent with the powers given by the Special Act of Parliament; and where special powers had been conferred by the Legislature—who would certainly have prior legislation in their mind—*primâ facie* the Company were entitled to perform those powers in their own way, provided they did so properly.

Justice DARLING: But who is to be the judge?

Mr. WHATELEY thought the Company themselves. The question was whether they were to be guided by the experience of their own Engineer, or were to be subject to the vagaries of the Local Authority. The Water Engineer and the Surveyor under the Public Health Act might totally disagree. If the building was a nuisance, then the Company could be indicted.

After further legal argument, their Lordships gave judgment.

Justice RIDLEY said the question raised by this case was one of some interest, and he had arrived at the conclusion that the decision of the Magistrates was not a correct one. By the Act of 1897, the Company were given power to make and maintain certain water-works, which included, among other things, a high service water-tower to be situated in a particular field. The question now arose whether they were entitled to do this without submitting plans for the approval of the Rural District Council, in accordance with bye-laws 93 and 94 passed by the Council. He thought they had no power to do so. The contention of Mr. Whateley was that they—when they had once received authority from the Legislature to put it up—received an implied authority to build it as they thought fit. He could not accept this argument at all. It seemed to him the precise effect of the Act was merely to give the Company power to put up a tower in the field. They were in no better condition than a private owner would be who wished to put up a building on his own property, and who, along with all other persons, must, unless specially exempted, comply with the law as laid down in the Public Health Act, 1875, under the authority of which the Council were acting in requiring the Company to make application. It was contended by Mr. Whateley that the Public Health Act did not apply, because it was not incorporated with the Special Act; that it ought to have been incorporated if it were intended to have effect on the Company; and that they had powers given them independent of the general law. He (the Judge) could not accept this view. He could not see that they were exempted, and thought the Act was passed in such a way as to bring the beneficiaries under the general law. For these reasons, he thought it was proper and right that the Company should make application in the way specified by the bye-laws; and the appeal would therefore be allowed with costs.

Justice DARLING said he entirely concurred.

Leave to appeal further was refused.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

Friday, Oct. 27.

(*Before Mr. Justice* MATHEW *and a Special Jury.*)

Flame v. The Ilford Gas Company.

This was an action to recover damages for personal injuries sustained by the plaintiff, as was alleged owing to the negligence of the defendants. The plaintiff is a chemical and manure manufacturer, residing and carrying on business in the neighbourhood of Ilford; and he was a customer of the defendants for coke. On Oct. 18, 1898, he went to their yard with a horse and two-wheeled cart, and purchased six sacks of coke. In driving out of the yard, the wheel jerked against a grid, which was alleged to be projecting several inches from the surface, and plaintiff was thrown out; his left leg being caught in the shaft, and broken. He was taken to West Ham Hospital, where he had to remain 28 days. He was then conveyed home, where he had to stay in bed for three months, after which he was able to get up and go about on crutches. It was said that he would always be lame.

Mr. MAYER and Mr. EDWARD BROWNE appeared for the plaintiff; Mr. DICKENS, Q.C., and Mr. MACASKIE represented the defendants.

Plaintiff deposed to the above facts, and said that a great portion of his business consisted in the preparation of roker fish skins, which were made into a sort of isinglass, and sold at 2s. 6d. per lb. to brewers for fining beer. On the day of the accident, he had put 10 cwt. of these skins into soak; and they were entirely spoiled through his not being able to attend to them. His average profits were £10 a week.

Cross-examined: His landlord, Mr. Ingram, had brought an action for ejectment against him, and for recovery of £60. In these proceedings, he made an affidavit saying there was stock to the value of £356 on his premises. He kept no accounts. The process of preparing the skins was a secret known only to himself. He had never seen the iron box in the road. There were iron pipes and wood lying by the side of the road.

Re-examined: He bought the rough skins from fishmongers, and men who collected them and brought them to him. It took 10 cwt. of rough skins to produce 1 cwt. of roker skins.

Dr. *Augustin Griffith*, now of Brighton, but previously in practice at Ilford, gave evidence as to plaintiff's injuries; having attended him on his return home from the Hospital. Both bones were broken badly; and the veins and arteries were also much injured.

Dr. *C. S. Dowdell*, of Ilford, who took over the practice of the previous witness, and had attended the plaintiff since, also gave evidence. He did not think plaintiff would ever be much better than he was at present.

Police-constable *Yeates* said he removed plaintiff on an ambulance to the hospital. He examined the ground where the accident occurred, and found a plate of iron about 6 inches square standing up 4 or 6 inches from the surface of the ground; but water was round it, within ½ inch of the surface.

At this stage, a consultation took place between Counsel, as the result of which

Mr. DICKENS said he had been convinced, from the evidence given, that the defendants had been misled by statements made to them by someone whose name he need not mention. They were now willing to submit to a verdict for £250.

The Case of Main-Layers under the Workmen's Compensation Act.

In view of the importance of the judgment of his Honour Judge Stonor, at the Marylebone County Court, in the case of *Bennett v. Aird and Sons* (briefly reported in the "JOURNAL" for the 17th inst., p. 945), and the comments thereon which have since appeared in our columns, we reproduce the text of the judgment, as given in the "Law Times."

The applicant in this case was employed by the respondents in striking an iron wedge to open a road underneath which water-pipes were being laid by the respondents. Another workman was striking the wedge alternately with him, and knocked it on one side. The applicant's hammer missed the wedge, swung right round, and dislocated his shoulder, which he has since been unable to use. The applicant deposed that he had sometimes to help in lowering the pipes, and for that purpose in working a pulley by which they were lowered. The respondents' Manager, who appeared as their representative by leave under Rule 32 of the Workmen's Compensation Rules, 1898, deposed that there was no mechanical power at all used on the job (which I think was erroneous); and he submitted that the case did not come within the Act. He also admitted that the applicant was entitled to damages if it did fall within the Act, which is certainly very doubtful. The only words in the Workmen's Compensation Act, 1897, sec. 7 (1), which can include it are "engineering work" as defined by the same section (2)—viz., "any work of construction, alteration, or repair of a railroad, harbour, dock, canal, or sewer, and includes any other work for the construction, alteration, or repair of which machinery driven by steam, water, or any other mechanical power is used." Now, the first question is whether the words "any other work" in this section 7 (2) mean any other work whatever, or only any other work *ejusdem generis* with work done on a railroad; . . . and "sewer," of course, also falling within the subsequent words of the section, which I shall consider hereafter. This point is very ably treated in Mr. Minton-Senhouse's and Mr. Emery's Treatise on the Employers' Liability Act and the Workmen's Compensation Act, p. 149; and I agree in the view there taken that the words "any other work" must be restricted to work *ejusdem generis* with the works previously mentioned in the section. But I think that the laying of pipes for water, gas, or any other purpose is *ejusdem generis* with works for the construction, alteration, or repair of a "sewer;" and that so far the present case is within the Act. The subsequent words, however, requiring that the work should be one in which "machinery driven by steam, water, or other mechanical power, is used," give rise to further and very difficult questions. It is, I think, evident that "machinery" (a word of which no definition is given in the Act) was used on this work—viz., a pulley and chain suspended on shears, fastened together at the top, and forming a tripod. But the question remains whether such machinery was "driven by any mechanical power" or not. Now, a pulley is defined as a mechanical power along with the lever and others in Nuttall's Dictionary; and, if the action of the pulley is to be regarded as the mechanical power that drove the machine and lowered the pipes, the case is within the Act. If, on the other hand, the manual labour which set the pulley in motion is to be so regarded, the question still remains whether such manual labour is to be considered as "mechanical" or not. In Webster's Dictionary the word "mechanical" is given, among other meanings, the following: "Acting by physical power;" and this would almost seem to meet the present case. But, on the whole, I think that the words "mechanical power" ought also to be construed as *ejusdem generis* with those mentioned immediately before—viz., steam and water, which act automatically and, generally speaking, continuously after having been put into motion in the first instance by manual labour. I therefore, on the whole, am of opinion that the present case does not fall within the Act, and give my award for the respondents without costs.

Paignton Gas Company.—The half-yearly general meeting of this Company was held on the 20th inst.—Mr. F. Palk in the chair. The accounts presented showed that the receipts for the half year ending June 30, including the balance brought forward, the stock in hand, and the book debts, amounted to £4257, and the expenditure to £2722; leaving a balance of £1535. The Chairman said the profits for the six months amounted to £1142; and he moved the declaration of an interim dividend of 4 per cent. This was agreed to.

Increase in the Birmingham Corporation Gas Fitters' Wages.—The fitters in the service of the Birmingham Corporation Gas Department recently applied for an increase of wages; the present rate being 8d. per hour for fully-qualified men. The Gas Committee made inquiry, and found that in some other large gas undertakings, both in the Midlands and elsewhere, fitters are paid at the rate of 8½d. per hour; and the Committee agreed to adopt this rate for Birmingham, as from the 1st prox. They are of opinion that this increase can be granted without injustice either to the consumers or to other gas-fitters in the trade.

The Birmingham Gas Committee and Reservists.—Unanimous approval will be given to a decision arrived at by the Birmingham Corporation yesterday week with reference to the Reservists in their employ who have been ordered to rejoin their regiments. Any acute distress among the families or relatives of these men will be at once relieved; and in other cases such assistance as may be desirable will be given after full inquiry has been made. This applies to all men who have been in the employ of the department for three months and upwards. Notice will be given when the allowances are to be stopped. Subject to the consent of the Finance Committee, which, with the Gas Committee, have control of the superannuation scheme and pension allowance scheme for workmen, the Committee proposed that the Army Reserve men, while on active service, shall be considered as absent on leave for the purposes of these schemes.

Wages in the Coal Trade.—Preliminary steps, says "The Times," are being taken on behalf of the miners connected with the Miners' Federation of Great Britain to reopen the wages question. It has already been decided to hold a meeting of the Executive Committee of the Federation at Burslem on the 13th prox.; and there is a demand from the whole of the districts that an application should be made to the coalowners to the effect that, in view of the great activity in the trade and the high prices which are being realized, the present rate should be increased. It will be remembered that wages were advanced by 2½ per cent. on the 1st inst., and that this amount brought them up to 40 per cent. above the 1888 level—the figure at which they stood before the great strike in 1896. On the 1st inst., however, colliery proprietors generally added 1s, and in some cases 1s. 6d. per ton to their prices; and the miners claim that they are entitled to some share in the profits which are being obtained. So far as can be ascertained, the employers will strongly oppose any increase in wages, on the ground that it is not warranted. Mr. B. Pickard, M.P., the President of the Miners' Federation, has already been in communication with Mr. Ellis, the Secretary to the Coalowners' Association; and a formal application has been made for a joint meeting to be called to consider the question of an advance.

MISCELLANEOUS NEWS.

GAS COMPANIES' PROTECTION ASSOCIATION.

The Second Annual General Meeting of the Association was held last Thursday, at the Westminster Palace Hotel—Mr. GEORGE LIVESEY in the chair. The following were present: Mr. T. Berridge (Leamington), Mr. C. E. Botley (Hastings), Mr. C. W. Braine and Mr. H. H. Jones (Wandsworth and Putney), Mr. A. H. Cane (Reading), Mr. G. Clarry (Cardiff), Mr. W. R. Cooper (Banbury), Mr. H. Hart (Canterbury), Mr. H. E. Jones (Commercial Gas Company), Mr. W. King (Liverpool), Mr. H. Morley (Cardiff), Mr. Charles M. Ohren (Crystal Palace District Gas Company), Mr. J. Pye (Chester), Mr. C. Crowther Smith (Southampton), Mr. A. G. Snelgrove (West Ham Gas Company), Mr. S. Y. Shoubridge (Crystal Palace Company), and Mr. W. H. Troughton (Gravesend).

The SECRETARY (Mr. F. E. Cooper) read the notice convening the meeting and the minutes of the last meeting, which were duly confirmed. He also read letters of apology for non-attendance from Mr. Henry Kimber, M.P., the President, who was engaged at another meeting; and from Mr. C. Meiklejohn, of Rugby, who said the meeting of the Midland Association of Gas Managers was fixed for the same day, so that it was impossible for him to attend.

Mr. H. E. JONES asked if the meeting of the Midland Association had not probably kept away several other members.

The SECRETARY said undoubtedly this was the case.

The CHAIRMAN said arrangements must be made next year that the two meetings should not clash with each other. He then called upon the Secretary to read his report as to the proceedings of the past year.

The SECRETARY thereupon read the following report:—

The Association has carefully looked after the general interests of gas companies during the year which has elapsed since the last annual general meeting. The following is a short statement of its proceedings.

A caveat was entered against the application to the Privy Council for a prolongation of Coze's patent for improvements in retorts for the distillation of coal and other solid matters, and in apparatus connected therewith. As the application was opposed by several other persons and companies interested in the question, the Committee did not consider it necessary to incur further expense, and therefore did not proceed with the matter. It may, however, be stated that the application was ultimately rejected.

The Association offered considerable opposition to a Bill introduced into Parliament under the name of "The Petroleum Bill" for raising the flashing-point of oil; and, at the request of the Association, Mr. H. Kimber, M.P., its President, blocked the Bill. A statement was prepared by the Secretary and circulated among the members of the House of Commons; and ultimately the Bill was rejected on second reading.

Two Bills were introduced into Parliament by the National Telephone Company, enabling them to break up streets, which seriously affected the rights of gas companies. The Committee caused draft petitions to be prepared against the Bills, and sent round to all the members of the Association, with the result that a large number thereof sealed and deposited the same in the House.

The Secretary has had correspondence with several secretaries or other officials of gas companies, and also with the Comptroller of Stamp Duty, in reference to the Somerset House Authorities' contention that they were entitled to be paid stamp duty on the increase in nominal value of the stock or share capital of gas companies by reason of the consolidation of such shares or stock. The result of the correspondence was that the Somerset House Authorities agreed not to require the payment of the duty until judgment has been given in the action now pending between them and the Midland Railway Company on this question.

The Association were requested by the Liberty and Property Defence League to present a petition to both Houses of Parliament in favour of a limitation being put upon trading by municipalities; but as there was not time to summon a meeting of the Committee and get the petitions approved and signed by the date desired by the Liberty and Property Defence League, the Chairman did not consider it advisable to trouble the Committee in the matter. Subsequently Sir William Walrond last session gave notice of his intention to move for an appointment of a Select Committee to inquire into this question. Your Committee then held a meeting to consider the matter, and decided that the effect of the motion should be watched, and that if Sir William Walrond's Committee were appointed, the Association should give evidence before it. The motion, however, was delayed from time to time, and ultimately abandoned for that session. A copy of the resolutions passed at the meeting held to consider this question was sent to each member of the Association.

The Secretary has from time to time throughout the year been applied to by members of the Association for information and advice in legal and other matters affecting gas companies, which he has, of course, at all times given to the best of his ability.

It is satisfactory to note that the number of members of the Association has increased from 56 to 67; and it is hoped that each year the number will increase.

The balance-sheet, showing the receipts and expenditure from the formation of the Association up to Oct. 26, 1899, which had been circulated in the room, was taken as read.

The CHAIRMAN, in moving the adoption of the report and balance-sheet, said there was really hardly anything for him to say. The Association had fulfilled its purpose, and had been very useful; and it would no doubt be increasingly so as its purpose became more known. He understood that Mr. Cooper had had a good deal of correspondence with different members who wrote to him for information on all sorts of questions, which he had been able to supply; and this was one of the most useful functions the Association could fulfil. There had been some question as to the scope and extent of its duties. For instance, in the case of the Telephones Bills, notices had been sent to all the members, with a suggestion that petitions should be presented against the Bills. A number of companies acted on the suggestion, and employed their own Solicitors and Parliamentary Agents to engross and present a petition in the form furnished by the Secretary. But some had applied to Mr. Cooper to do this work; and the question had been raised whether the Association ought not to undertake the duty free of expense to the members. The Committee had discussed the matter, and there was a general consensus of opinion that this would be rather beyond the province of the Association; and it would certainly be beyond its means. They had not the funds to undertake legal work of this kind; and he thought, as Mr. King put it last year, the object of the Association was to act as a watch-dog, to watch all proceedings in Parliament or elsewhere, which might affect the interests of gas companies, and inform the companies thereof. When they were so informed, the responsibility as to what action they should take rested with them, and not with the Association. If, however, the members thought the scope of the Association should be enlarged, it was quite open to them to make the suggestion; but if such enlargement were agreed upon, there must also be an increase in the subscriptions. On referring to the balance-sheet, it appeared that they had just about paid their way. It was true that they had a balance of more than £300; and the subscriptions were £321. But in the first year there were only the preliminary expenses, represented by the first two items. Since that time the annual expenses amounted to something like £250, as against an income of £320; and a margin of £60 or £70 was none too much, seeing that during the past year there had been no exceptional outlay or work, and it was quite possible that in some years a good many extra expenses might have to be incurred. If the work were increased, therefore, the subscriptions must be raised—unless, indeed, they had a large accretion of members. They had only 67 as yet, which was a very small proportion of the gas companies in the Kingdom; and he was sorry to say that this apathy was characteristic not merely of gas people but of many others. Lord Wemyss started an Employers' Parliamentary Council, because he thought it was very advisable for employers to unite in this way and have an Association similar to this one. But the great majority of employers were perfectly apathetic about it; it was only a few who saw the necessity for such action. It was the same with gas companies. Only a small number supported the Association. If they could get a considerable proportion to join, the subscription might be reduced, or further work might be undertaken; but at present he did not see any possibility of doing either. He thought they must go on as they were, at any rate for a few years.

The SECRETARY explained that the amount of subscriptions for the two years respectively appeared the same in the balance-sheet, notwithstanding the statement that there had been an increase in the numbers, because this increase all took place previous to June, to which date the accounts were made up.

Mr. H. E. JONES, in seconding the motion, said he was not at all discouraged at the smallness of their numbers at the outset, because it was well known that minorities were generally in the right; and no doubt when they saw how right they were, the majority would come over to them. He agreed with the view that they were simply a Vigilance Committee. It would be impossible to undertake parliamentary proceedings on behalf of particular companies, or even of the entire body, on the present footing. But the facilities afforded by the Secretary and the office had been very favourably spoken of to him. Mr. Cotton, of Dublin, recently told him how glad he had been to avail himself of the services of the Secretary in engrossing and depositing a petition which would have put his Company to great trouble and expense to attend to themselves; and he thought the charges were very reasonable. While the Association could not undertake such duties, he thought possibly an arrangement could be made with Messrs. Cooper under which members might avail themselves of their services on reduced terms.

Mr. H. HART fully agreed with the motion to adopt the report, which he regarded as very satisfactory; but, with all deference to the Chairman, he considered that the Association ought to do something more than merely watch. If at any time their interests were proposed to be affected by any Bill in Parliament, he thought it should be the duty of the Association to organize the opposition, so as to secure unity of action. He was quite aware that the means at their disposal were not sufficient to combat any powerful interest; but he believed that if gas companies were seriously affected, they would find the necessary funds to organize and defend themselves. Up to the present there had been no such attack threatened; and therefore the course suggested by the Chairman had been sufficient. But should their interests be affected, he believed all the gas companies would amalgamate their forces, and then something beyond "watching" would have to be undertaken.

The CHAIRMAN said the Secretary had received a letter from Mr. Hall, of the Matlock Gas Company, which he would ask him to read, as it was somewhat *à propos* to Mr. Hart's remarks.

The SECRETARY accordingly read Mr. Hall's letter. He expressed regret at not being able to attend the meeting, as there were several points on which he would have liked to speak. First with regard to the unsettled feelings which the directors of gas companies must experience on account of their liability to compulsory purchase; and he suggested that the Association should take some steps to get it affirmed that, when a company fulfilled their statutory obligations without serious complaint, they should be secure in their position. If this were the case, there would be much greater inducement to keep up the quality and keep down the price of gas. At present, if they made a substantial reduction in price, leading to a temporary diminution of profit, advantage might be taken of the lower rate of profits to push on the purchase. If profits were large, it excited the cupidity of the local authorities; while if they were small, they said then was the time to buy. He suggested that the Association might take some action in this direction in connection with the inquiry on the subject of municipal trading. Again, with regard to attacks made by ignorant persons on gas companies from time to time in newspapers all over the kingdom, he suggested that members in the locality affected should send up copies of any such attacks, which should be dealt with by competent persons, and replies sent to the papers in which the attacks appeared. He knew of one instance in which this system had been carried on in a very elaborate and careful manner, and with great success.

The CHAIRMAN remarked that the Association had resolved to lay some evidence before the proposed Committee on Municipal Trading, had it been appointed.

Mr. W. R. COOPER desired to take the opportunity of thanking the Secretary for the kind manner in which he had given him information for which he had asked, which had been very useful. He was, however, not at all in favour of the Association undertaking anything in the way of parliamentary business. Those who wanted anything beyond information and advice should be prepared to pay for it.

The motion for the adoption of the report and accounts was then put, and carried unanimously.

The CHAIRMAN said the next business was the election of six members of Committee in place of those retiring. The Committee were in some difficulty as to how the six members to retire the first year should be selected; but they ultimately decided to take the first six names alphabetically—viz., Messrs. Hart, Jones, King, Livesey, Phillips, and Sellers. They all offered themselves for re-election; but no one would feel offended if the members were of opinion that a change would be advisable. He thought in future it would be well that a list of the members retiring should be sent out with the notice of the meeting, and that nominations should be invited.

Mr. BERRIDGE moved that the retiring members of the Committee be re-elected.

Mr. PYE seconded the motion; and it was carried unanimously.

The CHAIRMAN, on behalf of himself and his colleagues, having returned thanks for this renewed mark of confidence, which they all highly appreciated,

Mr. HART moved that a report of the meeting, including the Secretary's report, should be distributed, not only to the members, but to gas companies generally. This would probably bring them an accession of members.

Mr. BOTLEY seconded the motion, which was unanimously agreed to.

Mr. SNELGROVE then moved a vote of thanks to the Chairman, which was seconded by Mr. C. M. OHREN and carried unanimously.

The CHAIRMAN, in responding, said it was one of the greatest satisfactions of his life that he was always received with so much kindness by his brethren in the gas world.

The proceedings then terminated.

THE PROPOSED PURCHASE OF THE CARDIFF GAS-WORKS BY THE CORPORATION.

Negotiations to be Reopened.

A Special Meeting of the General Purposes Committee of the Cardiff Corporation was held on Monday last week—the MAYOR (Alderman Sir Thomas Morel) presiding—to consider a proposal to reopen negotiations with the Cardiff Gas Company, with the view to the purchase of their undertaking. The interest evinced in the subject was shown by the large attendance of members.

The MAYOR opened the proceedings with some explanatory remarks as to the reason for calling the Council together as the General Purposes Committee to consider the question to be submitted to them, and stated that this course was deemed advisable by several of his colleagues whom he had consulted on the matter. He then went on to say that the meeting had been convened for the purpose of considering the desirability or otherwise of reopening negotiations with the Cardiff Gas Company for the purchase of their undertaking. He had ventured to bring the matter once more under the notice of the Council, in the belief that the time had arrived when, in the interests of the ratepayers of the borough, the municipalization of the gas undertaking should be again considered. It would be in the recollection of most of the members of the Council that the matter was considered in 1890, a Sub-Committee being appointed on the 30th of January in that year to approach the Directors of the Gas Company to ascertain if they were willing to sell their undertaking to the Corporation, and upon what terms. The Sub-Committee had several interviews with the Directors, and they ultimately informed the Company that they were prepared to recommend the Council to acquire the undertaking at "27 years' purchase of the net revenue after the interest on the debt had been paid; the purchasers to take the reserve fund, and to pay the debt named by the Chairman—viz., £56,000—and the last half-year's statement to be the basis." In reply, the Directors said they were willing to recommend the shareholders to accept 27 years' purchase upon the distinct understanding that the Company should retain the reserve fund, but that they would take the whole responsibility of compensation; and that the Corporation should pay the then debt of the Company, amounting to £56,000. The report of the Sub-Committee contained a statement as to how the amount of the purchase-money was made up; and it was as follows:—

The basis of purchase is the last half-year's statement of the Company, made up to Dec. 31, 1889, which was stated definitely at the time of the conference to be £8403; thereby giving a net annual profit of £16,806. This, multiplied by the agreed number of years' purchase, gives a total of £453,762, to which must be added the amount of the Company's temporary loans—viz., £56,000—making a grand total of £509,762. However, the account which has since been published shows the net half yearly profit at £8631 17s. 10d., or a net annual profit of £17,263, which, multiplied by the agreed number of years' purchase, gives £466,101, to which must be added the amount of the Company's temporary loans; making a total of £519,701. The Sub-Committee, having regard to the disparity between these amounts, sought a further interview with the Directors of the Company before proceeding to recommend a basis of purchase; and, after protracted negotiations, they have agreed to recommend the purchase at the sum of £505,000—the Corporation to have unfettered discretion as to the employment of the present staff, and the Company to retain the reserve fund, and undertake to compensate any of the officials who may not be required or taken over by the Corporation.

It would also be in the recollection of those present that, on these terms being submitted to the Council, the recommendation of the Sub-Committee was rejected, and the matter allowed to drop. He was among those who at that time voted against the purchase; but in giving his vote he still hoped that the negotiations would not be dropped, but that further efforts would be made to obtain better terms from the Company. Since that time, however, no action had been taken by the Corporation to reopen negotiations; but, having regard to the great increase in the borough of Cardiff, to the greater demand which had been made for gas—not only for purposes of lighting, but for cooking, heating, &c.—to the continual extension of the works of the Company, and to the increased profits, he now felt very strongly, although he was one of those who opposed the purchase in 1890, that the time had come when negotiations should be reopened. Without wishing at this stage to weary the Committee with a mass of figures, he thought he might give them a short comparison of the position of the Company in the years 1889 and 1898. In the first place, he found from the statement of accounts that whereas the total paid-up stock of the Company on Dec. 31, 1889, was £227,571, on the 30th of June last it amounted to £441,087. There was shown, however, in the accounts for 1889 the sum of £53,600 as temporary loans; but in the accounts for the half year ended June last there were none. He found also that whereas the net profits of the Company for the year ended Dec. 31, 1889, were £16,803, the net profits for the year ended December, 1898, were £33,620. The members would at once see what a considerable augmentation there was in the revenue. The increase in the quantity of gas supplied as well as in the augmentation of the receipts from public and private consumers between the years 1889 and 1898 was very great, as could be gathered from the following figures:—

	1889. Cub. Ft.	1898. Cub. Ft.	Increase. Cub. Ft.	Percentage.
Gas supplied .	453,413,000 ..	699,548,100 ..	246,135,000 ..	54·28
Receipts—				
Private consumers . .	£58,033 ..	£98,110 ..	£40,077 ..	69·05
Under contracts	6,672 ..	7,575 ..	903 ..	13·53
For residuals.	10,588 ..	15,644 ..	5,056 ..	47·75
Rentals, &c. .	3 338 ..	6,464 ..	3,126 ..	93·64
Total . .	£78,631	£127,793	£49,162	62·52

These figures showed very clearly the great increase that had taken place in the undertaking of the Company since the negotiations for purchase in 1889. At that time the probability of electric light superseding gas was a very strong argument against purchasing; and it was predicted that the demand for gas, instead of increasing, would diminish. This, however, had not been the case. On the contrary, the demand for gas for all purposes had greatly increased; so much so, in fact, that at the present time the quantity supplied to private consumers was more than 50 per cent. in excess of that furnished in 1889. Having cited some of the principal towns owning gas-works, and conducting them successfully—among them being Barry, with which he was connected as a shareholder, and which had proved a wonderfully good thing for the town—his Worship said it appeared to him that there could not be any doubt that the question of the purchase of the gas-works by the Cardiff Corporation was one which at the very least demanded the earnest attention of the Council. They must take the responsibility of saying "Nay" or "Yea." They had as a Corporation very heartily adopted the principle of municipalization in reference to tramways, electric lighting, water-works, and other matters; and if the gas-works could be acquired by the Corporation at a price which would be remunerative to the town, he thought the principle should be adopted with regard to them also. He must, however, remind the Committee that they would not get the undertaking for nothing. The Company were perfectly satisfied with the value of their property, for it was a good thing to them. But they could not get more than their 10 per cent, whereas the Corporation could make much more than that out of it; and the difference between what the Company and what the Corporation could make would go to the benefit of the ratepayers of Cardiff. He therefore had much pleasure in moving—"That it be an instruction to the Parliamentary Committee to reopen negotiations with the Directors of the Cardiff Gaslight and Coke Company for the sale of their undertaking to the Corporation, reporting thereon to the Council."

Mr. GOOD rose to a point of order. He said he wished to ask the Town Clerk, through the Mayor, whether there was not a clause in the Municipal Corporations Act which would preclude any shareholder in the Company taking part in the discussion.

The MAYOR said that, whether there was such a clause or not, no one on the Council interested in the gas-works should take part in the proceedings. Such persons, if any, should at once retire.

Alderman JACOBS seconded the motion, and said he had every confidence that the town would benefit by the purchase.

Mr. J. TUCKER proposed that the Town Clerk should read out the names of the gentlemen who had been invited to the private meeting of a section of the Council called by the Mayor on the previous Wednesday. He said he should like, at the same time, to know whether there were any members present on that occasion who were shareholders in the Gas Company. It was important, for the guidance of the Council, that this information should be given.

Mr. GOOD seconded the proposition.

The MAYOR said he did not think he could ask the Town Clerk to do that. It was one of the privileges of the Mayor that he should be allowed, when in doubt as to the course he should adopt at any time, to ask the advice of a few members of the Council, should he deem it proper to do so.

Mr. LLOYD MEYRICK said he had never received a notice to attend a private meeting held to discuss public business; and he asked the Town Clerk what authority there was, under the Municipal Corporations Act, or any Act of Parliament, for a Mayor to call a meeting of selected members of the Council to discuss matters of public business.

The TOWN CLERK (Mr. J. L. Wheatley) said there was nothing whatever in the Municipal Corporations Act with regard to any private act the Mayor might wish to do. It was in his province to call a meeting of friends or other gentlemen whom he might wish to help and advise him. All the Mayor did was to consult these gentlemen on the matter of precedent—not on the question of principle, whether the Corporation should buy the gas-works or not, but simply on that of procedure, whether he should bring the matter first before the Parliamentary Committee, the General Purposes Committee, or the Council. This was all these gentlemen were asked to advise the Mayor upon.

The MAYOR said he considered he was fully justified in the course he had taken. He wanted guidance, and so he called a few members of the Council together to obtain it.

Mr. LLOYD MEYRICK asked the Town Clerk, in order to make matters perfectly clear, to read out both the circular sent out and the names of those to whom it was addressed. If the meeting was merely one of the Mayor's private friends, no one would restrain him.

The MAYOR: I am glad to hear that.

Mr. TUCKER again asked whether any of those present at the meeting were shareholders in the Company.

The MAYOR said that, as there had been suggestions that those he had called were shareholders, he did not think he would permit the names of those present to be read. He would say again, with all possible emphasis,

that no gentleman on the Corporation, if a shareholder in the Gas Company, should take part in the discussion.

After some further discussion,

The Mayor said there was no reason why the names should not be given. The Town Clerk would try to make up the list, and give it before the meeting ended.

Alderman Trounce said he was exceedingly sorry that this unpleasant episode should have marred the last week of the municipal year. He strongly opposed the suggested purchase. Their present indebtedness was £1,816,582, and, in addition, there were the bank overdrafts of £435,477—making a total of £2,252,059. He pointed out that they were committed to the carrying out of great unremunerative works in the near future. Their hands were therefore full; and this was one of the reasons why he refused to take further responsibilities. He should regard the purchase of the gas-works as a calamity; and if any disposition were shown to carry the proposal further, he would move that they should apply for information to other towns which had acquired such undertakings, as to whether the accruing profits had or had not been simply devoted to reducing the price of gas. He opposed the purchase nine years ago, and he did so again to-day. If those who opposed erred at all, they erred in endeavouring to serve the best interests of the ratepayers. This had been his aim ever since he became a member of the Corporation. They had been told of the rapid strides made in the development of the gas-works since 1890. When negotiations were commenced for purchase, the Committee reported that the net income for the previous year should be taken as a basis—that fact was recorded on the minutes. If the undertaking had been acquired then, a profit of 4 per cent. would have been necessary ever since in order to cover interest and sinking fund. As a matter of fact, not in a single year since 1890 had the net revenue been sufficient to pay 4 per cent. on what would have been paid. If in 1890 they had purchased at £505,000, a sum of £20,200 per annum, being at the rate of 4 per cent., would have been needed; whereas the net amount paid in dividend was £16,554. In the following year the capital was raised to £514,000, and at 4 per cent. £20,560 would have been needed; whereas the net amount of dividends was £17,075.

The Mayor asked Alderman Trounce to bear in mind that the 4 per cent. would include the sinking fund.

Alderman Trounce said he was not forgetting that fact. In the nine years, 4 per cent. on the outlay would have run up to £205,560; whereas the net payments in dividends during the same period were only £189,271. The Mayor had told them that the consumption of gas had increased very rapidly in the last ten years. He (the speaker) had the figures before him. It was true that before the electric light works were in full operation there was a more rapid demand for gas by private consumers; and from 1890 to 1894 there was an increased consumption of about 25 per cent. But what were the figures for the period covering 1894 to 1898? The 25 per cent. rate of increase had dropped to less than 5 per cent. For the six months ending June, 1895, the consumption was 338 million cubic feet; for the half year ending December, 1895, 339 millions; June, 1896, 335 millions; December, 1896, 334 millions; June, 1897, 343 millions; December, 1897, 340 millions; June, 1898, 355 millions; December, 1898, 344 millions. The remarkable fact was that whereas for the six months ending June, 1895, the consumption was 338 millions, it was only 344 millions for the six months ending December 1898—four years later. It was suggested that they should purchase on a 27 years' basis. Last year's profits amounted to £33,000, which represented a capital of £864,000; while the undertaking in the whole of its history had not paid more than 3 per cent. on this amount. How could they, therefore, commit themselves to negotiations in the face of such figures? Why should they wish to relieve the shareholders of plums, which to the Corporation would become bitter aloes? If the Corporation acquired the property and reduced the price of gas, who would benefit? Not the ratepayers as a whole, but the consumers.

Mr. Courtis: Where did you get the estimate of £864,000?

Alderman Trounce: We were told at the meeting last week that the profits were £33,000, which, multiplied by 27, would give £864,000.

Alderman R. Cory said nobody impugned the motives of the Mayor, who had nothing in mind except the best interests of the ratepayers.

Mr. L. Morgan rose to a point of order, and asked if Alderman Cory was a shareholder in the Gas Company.

Alderman Cory said he was, but he intended to speak against his private interests, as he would recommend that at the present time they should have nothing to do with the purchase scheme.

Mr. Good then moved—"That, in view of the present great indebtedness of the town, and of the weighty undertakings now pressing for completion, which will add considerably to that indebtedness, the question of the purchase of the gas-works be deferred." He said he considered that an attempt had been made to get £150,000 of the town's money on the previous occasion, when £500,000 was asked for the property; and in the figure which had been mentioned—nearly a million of money—it was plain that considerably more than £150,000 would now go out of the ratepayers' pockets for no value received.

The Mayor: Wonderful. (Laughter.)

Mr. Good (continuing) said he objected to the way in which the whole matter had been rushed upon the Corporation—rushed with the evident purpose of getting it included in the next Bill. As a ratepayer, he protested most emphatically against any increase in his burdens at a time when the town was already pledged to such vast expense.

Alderman Cory said he would second the amendment with the greatest pleasure.

On an appeal that the Alderman's action was *ultra vires*, he being personally interested in the Company, the objection was upheld.

Alderman Trounce thereupon seconded the amendment.

Mr. L. Morgan supported the proposition, on the ground that the supply of gas was a monopoly which ought not to remain in the hands of a private Company.

Mr. J. Jenkins said he must support the municipalization of such a great private monopoly as the Cardiff Gas-Works, and showed that this was one of the planks of the Labour platform. During his term as a councillor, he had seen one after another of these planks accepted by the Corporation; and he hoped that if the Company would sell at a reasonable price, their undertaking would soon belong to the people of Cardiff. They were not then discussing the details, but the principle of purchase. Before negotiations were concluded, he trusted that full opportunity would be given to the ratepayers in every ward of the town to ascertain exactly what it was proposed to do.

Mr. Allen, speaking in favour of the proposition generally, suggested that the matter was of such importance that it would be a mistake to leave negotiations entirely to the Parliamentary Committee. A Special Committee should be chosen for the work.

Alderman Beavan urged that it was wrong to state that they were not to discuss the price at all, for this question was involved in their resolution, as they must consider what was operating in their minds as to the terms; and there had been a price named—£864,000. On this he asked the Mayor whether he was prepared to deny that this was the figure they should base their calculations upon. Then, in addition to the purchase price, they had to consider, as nine years ago, the expense for new mains, extensions of services, buildings, &c., which would mean a million of money. Very properly, too, he thought the ratepayers would want a reduction in the price of gas as soon as the works became their property; and something like 20 per cent. would have to be added to the wages list, for they could not run the concern so cheaply as the Company.

The Mayor, in reply, said that according to Alderman Trounce's figures, it was plain that if they had purchased the gas-works and had not received a penny outside interest, the purchase-money would almost have been paid off by this time. Alderman Trounce's second objection was that they, as a Corporation, were already largely committed. A business man, if he had heavy commitments, would engage in something else, so as to meet them; and this was what was now proposed. Their profits could go to pay off their commitments as a Corporation. As to Alderman Beavan's objections, the fact was the Gas Company were so flourishing and they had been making so much money that they did not know what to do with it. They paid their workmen well; and the Corporation would simply have to do so too. But there would be no Directors' fees to pay. Another point was that the Company had officials whose salaries would probably not be so high if the Corporation became their employers. In fact, the town would receive much extra profit which the Company could not make.

The amendment was then put. Alderman Beavan alone voted for it with the proposer and seconder (Alderman Cory remaining neutral); and it was lost by 27 votes to 3. The motion was carried.

A Committee, composed of fifteen members, was then appointed to conduct the negotiations with the Company.

The Mayor subsequently read the list of members who had been invited to confer with him; and the proceedings closed.

LEEDS CORPORATION GAS SUPPLY.

Report on Carburetted Water-Gas Plant.

Mr. R. H. Townsley, the General Manager of the Leeds Corporation Gas-Works, has drawn up for the consideration of the Gas Committee a report upon the present output of gas, the capacity of the works, and possible extensions, together with the estimated cost of a carburetted water-gas plant. According to it the present capacity of the works collectively is equal to a production of 17,250,000 cubic feet per day. The maximum daily consumption last winter for the whole of the city was 15,000,000 cubic feet; and the department, therefore, possesses surplus producing power over last winter's maximum sales of 2,250,000 cubic feet per day, or equal to 15 per cent. A new retort-house to be erected at the York Street works next year will increase the power of production by a quarter of a million cubic feet per day; and on the assumption that the Committee may fairly anticipate an increase during the next three years of at least 5 per cent. per annum, Mr. Townsley is of opinion that the works are fully equipped to meet the demands upon them for the next three winters. With reference to the cost of a carburetted water-gas plant, Mr. Townsley points out that the quantity of water gas manufactured will probably be regulated by Government at a later date; a recent report to the Home Office recommending that the percentage of carbonic oxide in the mixed gases should not exceed from 16 to 20 per cent. at any time, and at night should be limited to 12 per cent. The largest quantity of water gas that could be manufactured at Leeds in the event of 12 per cent. being permitted is about 25 per cent. of the total make at any of the works; and the Committee, he thinks, would be quite safe in erecting plant at the various works to the extent stated. At the Meadow Lane works, there is ample space for the erection of a plant capable of making 2½ million cubic feet per day; and for a plant of this size he estimates the cost as follows:—

Three sets of apparatus complete, including boilers, engines, blowers, and all pumps and accessories.	£16,000	0	0
Relief holder	2,200	0	0
Purifiers complete, with centre-valve, connections, &c.	4,500	0	0
Station meter	1,000	0	0
Water-circulating apparatus, including tank, pumps, piping, &c.	650	0	0
Oil storage tank	1,000	0	0
Buildings, foundations, boiler setting, &c.	4,000	0	0
Connections, &c.	1,000	0	0
	£30,350	0	0

The question of the cost of 1000 cubic feet of carburetted water gas into the holder is a matter for further inquiry; but Mr. Townsley is of opinion that in the case of Leeds, with gas supplied at the low figure of 2s. per 1000 cubic feet, and having regard to the fact that the price of oil has recently considerably increased, it will be found to be not less than coal gas.

Boston (Lincs.) Public Lighting.—A special meeting of the Boston Town Council was held last Wednesday to consider a resolution of the Finance Committee recommending the Council to offer £60,000 to the Boston Gas Company for their undertaking. The Council rejected the recommendation, and decided instead to apply for a Provisional Order to enable them to provide the town with electric light.

CEARA GAS COMPANY, LIMITED.

The Annual General Meeting of this Company was held at the Offices, No. 9, Queen Street Place, E.C., on Friday last—Mr. HORATIO BROTHERS in the chair.

The SECRETARY (Mr. Thomas Guyatt) having read the notice convening the meeting,

The CHAIRMAN, in moving the adoption of the report and accounts, said that when last he had the pleasure of addressing the shareholders he had expressed a hope that the improved means of carbonizing which had been adopted, and which were then being carried out, would lead to better results being experienced in that department during the current year. He was glad to say this hope had been realized, as the facts he was about to quote would show. There had been no material increase in the quantity of coal carbonized; but there had been an addition to the quantity of gas sold of 1,279,000 cubic feet, and a decrease in the cost of coal of £295. Besides this, there had been reductions in the cost of manufacture, repairs, maintenance, general charges, and salaries, amounting in the aggregate to £806—making, with the decrease in the cost of coals, a saving in the production of the gas supplied of £1101. In addition to this, there had been an increase in the gas-rental of £1410, so that there had been a total increase over the previous year of £2511. But against these favourable results had to be set the decrease in the amount received for residual products and the profits on fittings, £650; and the increase in that ever-increasing charge, loss in exchange, of £1138. The profit for the past year, as shown in the balance-sheet, amounted to £3825, against £3589 for the preceding year; but as £336 had been deducted in part payment for the new retort-benches, the profit made in the past year was practically £572 in excess of that for the year 1898. Deducting the amount of the interim dividend paid in April last (£1611), there remained £2369 available for division. Last year he had expressed the hope that the announcement which the new President of Brazil intended to make, to place the finances of his country on a sound basis, would be successful, and thereby increase the exchange value of the milrei, which was then worth 8½d., and was now worth only about 7¼d.—the nominal value being 2s. 3d. Unfortunately for them, the President's well-meant exertions and intentions had not so far been successful, and consequently the item of exchange was, as he had already said, £1138 more than in the previous year. As would be seen from the accounts, the cost of reconstructing the retort-benches on the regenerative principle was £2017. This would be charged to revenue; and one-sixth of the amount was so charged in the year under review. The remainder of the sum had been carried to a suspense account, to be written off within the next three years. Reference was made in the report to the circumstance of the Brazilian Government order withdrawing or ignoring the right the Company possessed under the concession of importing certain articles used in the manufacture of gas free from duty. This order, in consequence of the intervention of the British Government and the protests of the Company, the Brazilian Government had cancelled; and they had admitted the justice of the Company's contention. From the latest information from Ceará, they learnt that the Government had ordered repayment of the duties improperly levied in the present year; and the Company were now endeavouring to secure the repayment in the same way of the duties levied in 1898. The shareholders would be pleased to learn that during the past year the make of gas per ton of coal had been 9705 cubic feet; the gas sold per ton having amounted to 9094 cubic feet. The carbonizing department and the general management of the works at Ceará were certainly creditable to the Manager and officials there. He regretted that they were not able this year to increase the dividend of 7 per cent. on the ordinary shares, as he had anticipated; but he thought the Company had been placed in such a position as to render this possible in the near future, if no unforeseen circumstances occurred to prevent them.

Mr. J. D. BLOUNT seconded the motion, which was carried unanimously.

On the proposal of the CHAIRMAN, seconded by Mr. BLOUNT, dividends were declared at the rate of 5 per cent. on the preference shares (less income-tax), and of 4 per cent. on the ordinary shares (tax free), for the six months ended June 30 last. These payments, with the interim dividends already paid, would make 10 per cent. on the preference shares and 7 per cent. on the ordinary shares for the year—leaving a balance of £458 to be carried forward.

The retiring Director (Mr. A. J. King) and the Auditor (Mr. Magnus Ohren) were then re-elected, on the motions, respectively, of the CHAIRMAN and Mr. G. R. GUYATT.

The CHAIRMAN, in proposing a vote of thanks to the officers, said that their Manager from Ceará was present; and he congratulated him on the successful working of the past year. There was still room for improvement; but they were thankful for what had so far been done.

The MANAGER (Mr. J. Reid) and SECRETARY both having replied,

Mr. F. E. LINGING proposed a vote of thanks to the Chairman and Directors. The value of their services, he said, was proved by the fact that in the past year the consumption of gas for private lighting had increased by 8 per cent., which was a very good result indeed.

The CHAIRMAN, in acknowledging the vote, said that so far no credit had been taken in the accounts for the duties which the Brazilian Government had promised to repay; and if this money was received, it would go a long way towards providing another 2 or 3 per cent. dividend on the ordinary shares.

The proceedings then terminated.

The Tynemouth Town Council have placed a contract for the construction of a new reservoir; the amount of the tender being £11,150.

Last month, 54 fresh disputes between workpeople and employers were reported, involving 8858 workpeople. The corresponding number of disputes in August was 33, involving 10,232 workpeople; and in September, 1893, 52, involving 7644 workpeople. Of the 65 new and old disputes, involving 45,851 workpeople, of which the termination is reported, 19, involving 2327 persons, were decided in favour of the workers; 24, involving 37,990 persons, in favour of the employers; 16, involving 4822 persons, resulted in a compromise; while, in the case of the remaining six disputes, involving 712 persons, work was resumed pending further negotiations.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 1047.

Issue.	Share.	When ex-Dividend.	Dividend or Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 13	10½	Alliance & Dublin 10 p. c.	21½—22½	..	4 13 4
100,000	10	"	7½	Do. 7 p. c.	15—16	..	4 13 9
800,000	100	July 3	5	Australian 5 p. c. Deb.	102—104	..	4 16 2
200,000	5	May 12	6	Bombay, Ltd.	6—6½	..	4 12 3
40,000	5	"	6	Do. New, £4 paid	4½—4¾	..	5 1 1
880,000	Stk.	Aug. 16	12	Brentford Consolidated	277—282	..	4 5 1
270,000	"	"	9	Do. New	210—215	..	4 3 9
50,000	"	"	5	Do. 5 p. c. Pref.	140—145	..	3 9 0
159,375	"	June 15	4	Do. 4 p. c. Deb.	126—130	..	3 1 7
220,000	Stk.	Sept. 15	11½	Brighton & Hove Orig.	255—265	..	4 6 9
226,320	"	"	8½	Do. A. Ord. Stk.	187—192	—3	4 8 7
973,500	Stk.	Aug. 16	5	Bristol, 5 p. c. max.	125—130	..	3 16 11
420,000	20	Sept. 29	10	British	43—45	..	4 8 11
50,000	10	Aug. 31	12	Bromley, Ord. 10 p. c.	24—26	..	4 12 3
75,000	10	"	9	Do. 7 p. c.	19—21	..	4 5 8
500,000	10	Oct. 13	6	Buenos Ayres (New) Ltd.	9¼—10	..	6 0 0
220,000	Stk.	June 29	4	Do. 4 p. c. Deb.	100—102	..	3 18 5
150,000	20	July 13	8½	Cagliari, Ltd.	28—29	..	5 13 10
100,000	10	Sept. 29	8	Cape Town & Dis., Ltd.	13½—14½	..	5 10 4
50,000	50	May 2	6	Do. 6 p. c. 1st Mort.	57—59	..	5 1 8
550,000	Stk.	Oct. 13	13½	Commercial Old Stock	310—315	..	4 5 9
200,750	"	"	10½	Do. New do.	240—245	..	4 5 9
200,750	"	June 15	4½	Do. 4½ p. c. Deb.	143—148	..	3 0 10
800,000	Stk.	June 15	10	Continental Union, Ltd.	183—187	..	5 7 0
200,000	"	"	7	Do. 7 p. c. Pref.	182—187	..	3 14 10
51,600	Stk	Aug. 31	14	Croydon A 10 p. c.	335—340	..	4 2 4
168,400	"	"	11	Do. B 7 p. c.	265—270	..	4 1 5
555,000	Stk.	Aug. 16	5½	Crystal Palace Ord. 5 p. c.	132—137	..	3 16 8
60,000	"	"	5	Do. 5 p. c. Pref.	140—145	..	3 9 0
486,090	10	July 23	11	European, Ltd.	21½—22½	..	4 17 9
854,060	10	"	11	Do. £7 10s. paid	15½—16½	..	5 0 0
14,993,075	Stk.	Aug. 16	4%	Gas-light and Coke	4 p. c. Ord.	105—107	+2	4 11 7
2,500,000	"	"	3½		3½ p. c. max.	97—99	..	3 10 8
3,799,735	"	"	4		4 p. c. Con. Pref.	121—124	+1	3 4 6
3,993,975	"	June 15	3		3 p. c. Con. Deb.	99—101	..	2 19 6
70,000	10	May 31	8	Hongkong & China, Ltd.	14—15	..	5 6 8
3,800,000	Stk.	May 12	10	Imperial Continental	220—225	..	4 8 11
473,600	Stk.	Aug. 16	3½	Do. 3½ p. c. Deb. Red.	101—104	..	3 7 4
75,000	5	June 15	6	Malta & Medn., Ltd.	5—5½	..	5 9 1
560,000	100	Oct. 2	5	Met. of Melbourne	5 p. c. Deb.	110—114	..	4 7 9
250,000	100	"	4½		4½ p. c. Deb.	108—110	..	4 1 10
541,920	20	May 31	5	Monte Video, Ltd.	10¾—11½	—2	8 14 0
617,946	Stk.	Aug. 31	9½	Newc'tle & Gateshd Con.	225—230	..	4 0 5
254,855	Stk.	June 29	3½	Do. 3½ p. c. Deb.	106—109	..	3 4 3
150,000	5	May 31	8	Oriental, Ltd.	7⅞—8	..	5 0 0
135,000	5	"	8	Do. New, £4 10s. pd.	6⅝—7	..	5 14 3
15,000	5	"	8	Do. do. 1879, £1 pd.	1½—1¾	..	4 11 5
60,000	5	Sept. 29	7	Ottoman, Ltd.	5½—5¾	..	6 1 9
500,000	100	June 1	6	People's Gas of Chicago	2nd Mtg. Bonds	102—106	..	5 13 2
851,070	10	Oct. 13	7	River Plate Ord.	11—11½	..	6 1 9
250,000	Stk.	June 29	4	Do. 4 p. c. Deb.	100—102	..	7 8 2
250,000	10	Sept. 15	10	San Paulo, Ltd.	12—13	..	7 13 10
135,000	Stk.	Sept. 15	10	Sheffield A.	247—249	..	4 0 4
209,053	"	"	10	Do. B.	247—249	..	4 0 4
447,427	"	"	10	Do. C.	247—249	..	4 0 4
5,600,000	Stk.	Aug. 16	5½	South Metrop., 4 p. c. Ord.	137—140	..	3 16 1
1,520,000	"	July 13	3	Do. 3 p. c. Deb.	101—103	..	2 18 3
120,000	Stk.	Aug. 31	6	Tottenham A. 5 p. c.	141—143	..	4 3 11
250,520	"	"	4½	and B. 3½ p. c.	102—104	..	4 6 6
55,100	"	—	4	Edmonton 4 p. c. Deb.	115—120	..	3 6 8
182,380	10	June 15	5	Tuscan, Ltd.	9—10	..	5 0 0
149,900	10	July 3	5	Do. 5 p. c. Deb. Red.	98—100	..	5 0 0
				WATER COMPANIES.			
746,184	Stk.	June 29	11	Chelsea, Ord.	313—318	..	3 9 2
150,000	"	"	5	Do. 5 p. c. Pref.	163—168	..	2 19 6
160,000	"	"	4½	Do. 4½ p. c. Pref. 75	145—150	..	3 0 0
175,785	"	Sept. 29	4½	Do. 4½ p. c. Deb.	150—155	..	2 18 1
1,720,560	Stk.	Oct. 13	7	East London, Ord.	203—208	..	3 7 4
654,740	"	June 29	4½	Do. 4½ p. c. Deb.	152—157	..	2 17 4
890,000	"	"	3	Do. 3 p. c. Deb.	101—103	..	2 18 3
700,000	50	June 15	7½	Grand Junction 10 p. c. max.	169—172	..	3 7 0
310,000	Stk.	Sept. 29	4	4 p. c. Deb.	133—138	..	2 18 0
708,000	Stk.	Aug. 16	14	Kent	3.0—355	..	3 18 11
160,000	"	"	7	Do. New, 7 p. c. max.	208—213	..	3 5 9
1,043,800	100	June 29	10½	Lambeth, 10 p. c. max.	295—300	..	3 10 0
406,200	100	"	8	Do. 7½ p. c. max.	225—230	..	3 9 7
850,000	Stk.	Sept. 29	4	Do. 4 p. c. Deb.	136—140	..	2 17 2
500,000	100	Aug. 16	13½	New River, New Shares	430—435	..	3 2 0
1,000,000	Stk.	July 28	4	Do. 4 p. c. Deb.	135—140	..	2 17 2
902,300	Stk.	June 15	7½	South-wark and	Ord.	210—215	+3	3 9 9
126,500	100	"	7½		7½ p. c. max.	193—198	..	3 15 9
489,200	Stk.	"	5		5 p. c. Pref.	165—170	..	2 18 10
1,019,585	"	Oct. 13	4	Vauxhall 4 p. c. A Deb.	131—136	..	2 18 10
1,155,066	Stk.	June 15	10	West Middlesex	298—303	..	3 6 0
200,000	"	"	4½	Do. 4½ p. c. Deb.	152—157	..	2 17 4
200,000	"	Sept. 15	3	Do. 3 p. c. Deb.	101—103	..	2 18 3

ELECTRIC LIGHTING NOTES.

The Electricity Committee of the Glasgow Corporation have agreed unanimously to recommend that churches be granted the use of the electric light at the rate of 3d. per unit, being half the ordinary rate. Why?

At the last monthly meeting of the Brighouse Town Council, it was decided that the price of electricity for lighting purposes should be increased from 5d. to 6d. per Board of Trade unit; a previous resolution of the Council that the price be 7d. being rescinded. This alteration in price, the Electrical Engineer reported, would reduce the deficiency of £205 for the past year to one of £58 in the current year. He presented a report recommending the laying down of new generating plant, if the Electric Lighting Department was to be made to pay.

By way of supplementing the instances of the unreliability of the electric light which were recorded last week, it may be mentioned that, owing to this characteristic of the illuminant, the members of the Birmingham Society of Friends commenced their series of Sunday evening special addresses under rather difficult circumstances on the 22nd inst. A gentleman from York was in attendance to deliver an address upon "Truth Speaking and Oath Taking;" but the electric light in the Meeting House in Bull Street failed, and the audience suddenly found themselves in darkness. The Friends are, as everybody knows, lovers of peace; and therefore it may be supposed that their language at the mishap was not such as to come within the scope of the second portion of the title of the address. While candles and other small lights were being obtained, Alderman White entertained the audience with a short history of the rise of the Society of Friends.

On Monday last week a deputation of representatives from the East London Vestries waited upon Sir Courtenay Boyle at the Board of Trade to urge upon the Board the advisability of revoking the Electric Lighting Orders granted to private companies, on the ground that they have failed to comply with the terms of the Orders. Mr. H. H. Marks, M.P., introduced the deputation, and pointed out that, though two years have expired since the Orders were granted for the lighting of Limehouse, Mile End, and St. George's-in-the-East, nothing has been done, while Whitechapel has started an electric lighting scheme of its own, upon which £100,000 has already been spent. Mr. Marks commented upon the complications that would be caused if, when Limehouse, Mile End, and St. George's are united with Whitechapel as one Municipality, part of the new area is lighted by municipal enterprise, and the rest by private companies. Sir Courtenay Boyle thanked the deputation for the clear and temperate manner in which the facts had been laid before him, and undertook to bring the subject at once before the President (Mr. Ritchie), with a view to seeing how far the views of the East London Local Authorities could be met.

In a leaderette on the subject of the failure of the electric light in Carlisle on the 15th inst., as recorded last week, the "Carlisle Express" says: "The sensational incident which occurred in Carlisle in connection with the electric light was sufficient to show that although by the use of electricity we may escape many of the dangers and disadvantages of gas, we are dealing with a mysterious agent which has little peculiarities of its own, and about which our knowledge is not yet perfect. One of the dangers attending upon the use of gas is that of explosion, and one of the disagreeable characteristics of gas is its bad smell. But the bad smell from an escape of gas has been appropriately described as a danger-signal which, if promptly regarded, may prevent a catastrophe. It appears, however, that from electricity we are still liable to have explosions, but without the advantage of any previous warning. . . . A similar accident is reported from Manchester, and other towns have had similar experiences. In Manchester, the explosion is said to have resulted from the use of some cables of old pattern, which are gradually being replaced by others of a later date. Is it possible that these old-fashioned cables can be in use in Carlisle?"

At a special meeting of the Leicester Town Council held last Tuesday, the Gas and Electric Lighting Committee reported that their Engineer (Mr. Alfred Colson, M.Inst.C.E.) had brought under their notice the rapid increase in the demand for electric current, the productive capacity of the central station at the Aylestone Road works, the capabilities of the present cables and transformers, and the probable demand for current in the near future. The Engineer advised that, in order to meet the anticipated requirements of the town during the next few years, a considerable extension of the generating and distributing plant would be needed, necessitating an estimated expenditure of £86,268. The Committee recommended that the works advised by the Engineer should be carried out, and that application be made to the Local Government Board for sanction to a loan of £100,000—the amount required to cover the above, and £13,732 expenditure already incurred beyond the sum previously sanctioned. In moving the adoption of the report, Alderman Lennard observed that for economic and effective street lighting there was nothing like incandescent gas; but there was a distinct field for both electric lighting and gas. As to private individuals producing installations cheaper than the Corporation, as was sometimes alleged, it simply could not be done. If the cost of the electric light became less, the Corporation would not only have to sanction this, but other sums like it, for further extensions. What was now proposed would last until 1903, when more plant would be added to last two or three years; and this would use up the £100,000 now asked for. He had every confidence in asking the Council to pass the resolution unanimously. Mr. Edwards seconded the motion. Alderman Wakerley asked if Alderman Lennard meant that there was a prospect of the price of the electric light being reduced from 4d. to 3d. per unit. Alderman Lennard, in reply, said they did not intend to go on the rates for this department, and for that reason the price could not be lowered until the Committee could clearly see their way to do so. The report was adopted.

In the course of a municipal election address on Wednesday, Alderman Lowden, of Leeds, contrasted the results of the Conservative and Radical management of the gas undertaking of the Corporation, and showed that by the former the ratepayers had benefited to the extent of no less than £78,158 in four years.

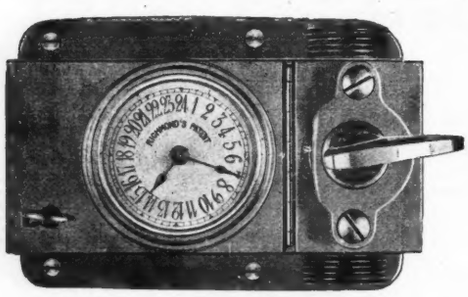


Fig. 1. OFF

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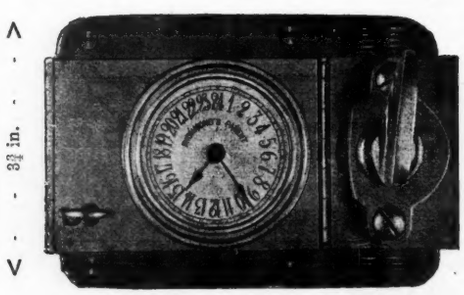

Fig. 2. ON.

This ingenious Clock-Work attachment can be fixed along with Gas-Fires in Bed rooms and Sitting-rooms, and enables Hotel Proprietors to charge by the Hour for the Gas consumed.

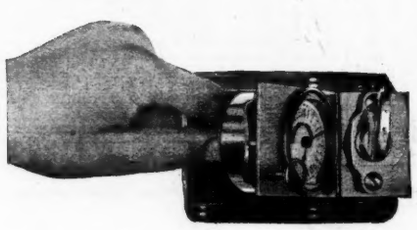

Fig. 3. WINDING

FALMOUTH CORPORATION AND THE WATER-WORKS.

Purchase Scheme Adopted.

A Statutory Meeting of the Falmouth Town Council was held on Thursday, for the consideration of a Bill authorizing the purchase of the water-works. A report by Mr. A. Silverthorne expressed the opinion that typhoid fever was endemic in the town owing to the fact that escaping sewer gas found its way periodically into emptied water-mains and services, through the vacuum established by shutting the water off at intervals. The recent more severe outbreak he believed to be due to the Water Company having themselves inadvertently fouled the high-level reservoir. In the construction of a small filter-bed, they had excavated polluted ground from a stream originally draining into the reservoir; and this had been so placed as to silt into the reservoir. The reservoir ought to be reconstructed so as to exclude all surface drainage; and he also recommended the removal of peat at the head of the upper pool, the purchase and expropriation of the pollution centres upon the feeders, the reconstruction of the filter-beds, and other measures. The works ought to be acquired by the Corporation at a cost which would involve no further liability for maintenance and interest and sinking fund than would be covered by the present revenue. The improvements and extensions would necessitate an additional expenditure of £15,000, which would mean an annual liability for interest and redemption of capital of £600.

The Mayor (Mr. J. Grose), in moving that steps be taken to promote a Bill, accused the Water Company of gross negligence, and appealed to the Corporation to give a unanimous vote in favour of the scheme. Dr. Harris, the Chairman of the Sanitary Committee, seconded the resolution, and said he believed 99 per cent. of the thinking population of the town were in agreement with the desire that the Corporation should purchase the water-works. Mr. F. J. Bowles complained that there had been no attempt to carry out the previous resolution of the Council, in favour of friendly negotiations with the Company and of joint action with the Corporation of Penryn. If the motion were carried, the flood-gates of all kinds of undesirable discussion would be opened; and it would hinder rather than advance the purchase of the water-works. If the time came when the movers in this matter took the whole of the Corporation into their confidence, and had the advice of a competent engineer, he would vote for the promotion of a Bill. Mr. H. S. Mackenzie contended that if it had not been for those who held shares in the Gas Company, the water-works would have been purchased 2½ years ago. Mr. Thuell suggested that there was no reason why the Corporation should not yet come to an arrangement with the Water Company, if the price asked was not extravagant. Mr. E. A. Banks thought that they should wait for the report of Dr. Buchanan, the Local Government Board Inspector. He did not believe the outbreak of typhoid fever had any connection with the water supply. The Town Clerk read a letter from the Directors of the Water Company, dated the 23rd inst., in which they said they were not desirous of selling their undertaking. Mr. Mead complained of the suspicious and circuitous way in which the question was introduced; and said that if the impression were removed that something was being hid from the ratepayers, the purchase of the water-works would have his hearty support. Mr. W. Banks expressed the opinion that the typhoid outbreak was due to the defective condition of the house drains, and not to the water supply. It was enough to make anyone indignant that Mr. Silverthorne should endeavour to bolster up a scheme, however desirable, on grounds calculated to hinder the town and depreciate the value of the water-works. He could have nothing to do with any purchase scheme introduced as this and its predecessors had been.

The resolution was carried by 9 votes to 2; the number of affirmative votes being a majority of the Council, which consist of 16 members.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

An attempt was made yesterday by the Dundee Town Council to come to terms with their gas stokers, who are making a demand for an increase of wages by 1d. per hour. At present the men work 56 hours a week, and are paid 7d. per hour, equal to 4s. 8d. per day and 32s. 8d. per week. The Gas Committee have ascertained that in Glasgow the same class of workmen receive 5s. 3d. per day; in Edinburgh, Greenock, and Paisley, 5s.; and in Aberdeen, 4s. 6d. The Gas Committee offer an increase of ½d. per hour; making the wages 5s. per day, or 35s. per week. The men's demand is for a wage of 5s. 4d. per day, or 37s. 4d. per week. The Council yesterday appointed a Sub-Committee to meet the men and endeavour to come to terms.

It was reported to the Gas and Electric Lighting Committee of the Aberdeen Town Council this week, that the vessel which has been chartered to carry coal for the gas-works has made thirty voyages during eleven weeks, and has carried 8675 tons of coal. The net cost of carriage has been 2s. 8¾d. per ton. The lowest price tendered by shipowners was 3s. 3d. per ton.

The Corporation of Stirling expended £2596 in opposing the passing of the Act incorporating the Stirling Gaslight Company. A much larger sum was spent in the preceding year in an abortive attempt to acquire the undertaking of the Company.

The municipal year being about to expire, candidates for honours are at present busy canvassing the electors. I cull the following specimens from the superabundance of oratory. In Glasgow, Mr. R. Mitchell, the Convener of the Gas Committee, said when he entered the Council the revenue was £428,000; it was now £700,149. The fears that electric lighting would make gas unnecessary had not been realized—indeed, the very opposite was the case, for the demand for gas was greater than ever, though there was also a big demand for electric lighting. The price of the electricity was very moderate as compared with other towns.

In Dundee, Mr. David Mathers said that the most serious item in connection with the gas-works was the cost of reconstruction—£75,000. The plans had been passed, and a goodly portion of the contracts had been entered into; and he trusted the additional monetary burden which

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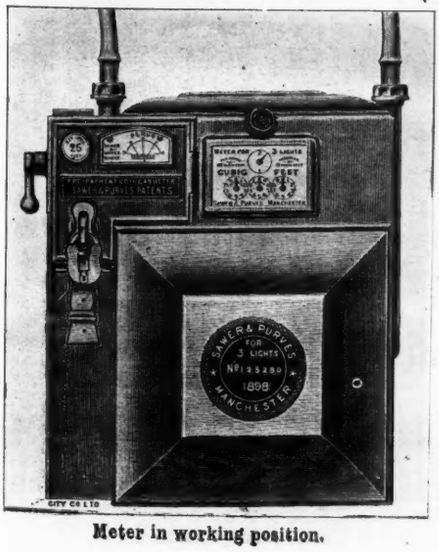

Meter in working position.

Meter with attachment removed without uncoupling.

would be placed upon the electors by this reconstruction would be compensated by the economical output of gas, so that, at any rate, they should not have to pay a dearer rate than they did at present.

In Falkirk, Mr. Wilkie said he was sorry to learn that the gas undertaking, which had now cost the town £120,000, was practically a white elephant. This was a serious matter; but how was it proposed to remedy this state of affairs? By going to Parliament for a Bill to erect new gas-works. He did not think they required new gas-works *in toto*. What was wanted was a new retort-house. When the ground was bought for the new gasholder at Parkhouse, it was the intention to put up gas-works there. They were told, however, that the ground was too soft. It seemed to be an admirable site; and he thought that if they would make a thorough examination, and take in the aid of concrete, &c., they would make it quite suitable to carry a retort-house. A retort-house was not a very weighty thing; and he did not think there would be any risk of subsidence by erecting one there. He considered the site an ideal one for an extension of the gas-works. On the other hand, Mr. Cook Rennie, the Convener of the Works Committee of the Falkirk Gas Commissioners, said that under the new management, and in consequence of the improvements carried out at the gas-works, the complaints as to bad gas had been disposed of. They would soon have to face the question of providing new gas-works. The bogey of electric light was always before them; but it was a curious fact that when electric light was introduced into a town, the consumption of gas increased. In the course of time, however, electric light plant would be erected alongside the refuse destructor—an appliance which was much needed.

In Dunfermline, Provost Scobie said that the quantity of gas manufactured during the year ended May last was 77,121,600 cubic feet; being an increase of 4,350,200 cubic feet as compared with the previous year's output. The number of accounts in May last was 5060; being an increase for the year of 648. It would thus be seen that they had a flourishing concern; and they would have been able to keep the price of gas the same as it was last year, had it not been for the great rise that had taken place in coal. In the same town, Mr. Blair said that one important matter in connection with the gas-works was the resolution come to in the spring of the present year to introduce plant at a cost of £1000 for the manufacture of sulphate of ammonia. Now, he thought this a very serious undertaking, in view of the manner in which the works had been carried on up to that time. If the old Company, with their long experience, did not see their way to manufacture sulphate of ammonia, it was somewhat risky on their part, with no experience whatever, to embark on such a venture, however favourable the forecasts might seem to be.

In Hamilton, Mr. Purdie said that the profits of the gas-works for last year amounted to £1856. Of this sum £1200 was written off for depreciation of plant, &c., and the balance was dealt with by placing £500 to Common Good Account No. 2, and carrying forward £156 to next year. Bailie M'Hale, the Convener of the Gas Committee, in reply to a question by ex-Bailie Tainsh, as to whether the gas works were managed by the Town Council or by him as Convener and Mr. Ewing as Manager, said that they were not managed by the Town Council, who were merely in the position of trustees for the public, and as such looked after their interests in connection with the works. There was only one Manager—viz., Mr. Ewing. He proceeded to make a comparison between the state of the works at the present time and what they were 22 years ago, when ex-Bailie Tainsh was Convener of the Gas Committee; and he pointed out that in 1877 salaries, wages, and so forth amounted to £1073, while during the past year they came to £3102. The quantity of gas made this year was nearly four times the amount manufactured in 1877, whereas the pay-bill was not three times greater. The wages in 1877 for producing 1000 cubic feet of gas were 10d, while last year the amount was 6·35d. Yet they had a Manager who was not satisfactory to a number of his colleagues. Further, the price of gas in 1877 was 4s. 2d. per 1000 cubic feet, and at the present time it was 2s. 1d. If they could get the same price for their gas now that Bailie Tainsh obtained in 1877, they could pay all their rates; but he did not think this would be proper economy, because anything the Town Council produced should be at the lowest possible price, and any profit there was should be devoted to the purposes of the works, even although it should result in an addition to Common Good Account No. 2. He had objected to the creation of this account, but was outvoted. All the same, this £500 was standing at the credit of that account; and it would not be his fault if it did not find its way into the resources of the Gas Department. He pointed further to the increased efficiency of the works under Mr. Ewing's management, describing the advance since 1877 as marvellous; and having pointed to the great progress that had been made in the use of cookers and other appliances for domestic purposes, he expressed the hope that they would make a still further advance by agreeing to fit up pipes and brackets and free meters in workmen's houses, so that the humblest member of the community should have the use of the gas. This was the sensible view. The heretical one was given by Treasurer Keith, who said that the Act of 1878 expressly declared that the gas-works and the burgh buildings, and the profits and interests thereon, shall be held by the Corporation for the behoof of, and the benefit of, the whole burgh. He maintained, as he had always maintained, that it was right and proper for them, if there was a profit on the gas-works, to apply it for the benefit of the ratepayers, and not for the consumers. In his own ward, he had come across numerous instances where his constituents had not gas in their houses, not because they did not want to pay for it, but because the owners would not put in the fittings. Why, he asked, should the ratepayers not have an interest in that which was their own, and why should those who burn gas get all the benefit?

A fortnight ago I wrote, regarding the fire which occurred in the Edinburgh Corporation electric lighting station at Dewar Place, that the Corporation would be obliged to face the subject of the duplication of plant. It did not then occur to me that they had already provided for it. My mind was running upon the idea of two sets of subsidiary plant being put down in the same works. The Corporation have accomplished duplication in another way by the building of an entirely new works, at M'Donald Road. A first section of these works is now in operation. The singular double event took place on Monday of laying

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the memorial stone of the building and turning on the current. The first ceremony was performed by Lord Provost Mitchell Thomson, and the second by Mrs. Mitchell Thomson. The new works will contain plant of over 30,000-horse power. At present, the engine power is equal to about 5000 horses. The two stations now serve the same mains, so that a breakdown in the one station can be prevented from becoming a total loss by the manipulation of the other. The new station, mains, &c., are, I believe, to cost about £450,000. As is well known, this most successful scheme of electric lighting for Edinburgh was designed by Professor Kennedy, who, by the way, began his career in an engineering shop in Leith. Professor Kennedy was present on Monday, and was complimented upon the circumstance that all the statements in his original report to the Town Council had been fulfilled. In the working out of the scheme, Professor Kennedy has had most valuable assistance from Bailie M'Kenzie, the Convener of the Electric Lighting Committee. I wish to refer to a remark by Bailie M'Kenzie, as being one worthy of being considered. He said that "the Lord Provost had referred to the consumption of gas going on increasing; but he thought that was a state of matters that could not continue indefinitely. There must be a time when a halt would be called in one or both undertakings, though no doubt there was a considerable field open for gas in the way of cooking. Between gas and electric lighting, a large amount had been spent on the illumination of the city; and he often felt a little timorous at the large sum at present being expended on electric light. He was quite sure that within the next five years the expenditure upon electric lighting in Edinburgh would amount to a round million of money." In this there is food for reflection. I would not go the length of saying that a halt will be called in either system of lighting, because, while the rush for the towns lasts, the increase of population will require extensions of the means of supplying light. But there may come a time when one or both systems will receive a check; and it is likely that this will take place by one going ahead at the expense of the other. Which of them is it likely to be? Whichever can supply the cheapest light, will receive the support of the public. In this connection, there is an incident which is instructive. Builders are erecting houses fitted for electric lighting, and are charging higher rents for them. The curious thing is that people are found who are willing to pay the higher rent; and it must not be forgotten that they also pay more for their light. Is this likely to go on? That is the question to be forecast. There is therefore room for a certain amount of timidity at the large outlay. A million sterling means, in interest, repayment, and depreciation alone, about £60,000 a year imposed upon the citizens. Are they likely to remain willing to bear that, or a greater, burden? This question will be answered according to the predilections of the people who care to think of it. At present there does not appear to be reason for answering it one way or another; and consequently the expenditure upon both lights will go on. But it will be the duty of those in charge of them to watch the flow of the tide; and in the event of signs of a turning, to shape their course so as to save their bark from disaster. Probably, when this time comes, if it does come, a working arrangement between the two lights would be the most sensible course; but this may be too much to hope for.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Oct.* 28.

Sulphate of Ammonia.—The market continues to droop; and the closing quotations are £10 15s. to £10 17s. 6d. per ton, delivered f.o.b. at the ports. Although there has been a good volume of business doing, it has not been sufficient to arrest the decline; buyers not being in any immediate hurry. Inquiry has, in fact, been more for forward delivery. But in this position producers can afford to wait; and they seem inclined to resist further depression. Speculators, however, continue to offer at a discount on spot prices, but scarcely low enough to induce very large business. London has been done at £10 15s. per ton, Beckton terms, for delivery up to the end of the year; but beyond that period, makers do not seem anxious to offer.

Nitrate of Soda is steady at 7s. 9d. per cwt. for good, up to 7s. 10½d. for refined, quality.

LONDON, *Oct* 28.

Tar Products.—At present there is an absence of that briskness which has previously characterized this market for some time. Somewhat lower prices are being taken for creosote oil; and benzols do not rally as was expected. Pitch is moderately steady; and, with the rapidly advancing price of coal, it should rather increase than decrease in value. Heavy naphtha is much in request; while crude, 30 per cent., naphtha and similar qualities are somewhat languid. Crude naphthaline finds ready buyers, who are also keen to secure stuff for 1900. There is no change in anthracene, which continues to be nominally quoted at low prices; the poorer "B" qualities really finding no buyers at any figure. Manufacturers are busy on old contracts, and will continue to be so until the turn of the year.

The average values of the week may be taken as: Tar, 16s. 6d. to 25s. 6d. Pitch, east coast, 33s. to 34s.; west coast, 32s. Benzols, 90's, 9d.; 50's, 10d. Toluol, 90 per cent., 1s. 2½d.; pure, 2s. Solvent naphtha, 1s. 2d. Heavy naphtha, 1s. 2½d. Crude, 30 per cent., naphtha, 4½d. Creosote, 3½d. Heavy oils, 65s. to 70s. Carbolic acid, 60's, 2s. 3d.; 75's, 2s. 9d. Crude naphthalene, 55s. Anthracene, nominal, "A," 3½d.; "B," 2½d.

Sulphate of Ammonia.—"Bears" and operators appear to have got entire hold of this article; and although considerable shipments are going on, values continue to decline. There are indications that better prices will shortly obtain; and makers would be wise not to press their production upon the market at the moment. £10 15s. may be taken as the average value, less 3½ per cent., at all ports.

The Directors of the Monte Video Gas Company, Limited, have declared an interim dividend of 6s. per share, less income-tax, for the half year ended the 30th of June.

The Directors of Meters, Limited, have declared dividends on their preference shares at the rate of 5½ per cent. per annum, and on the ordinary shares at the rate of 5 per cent. per annum.

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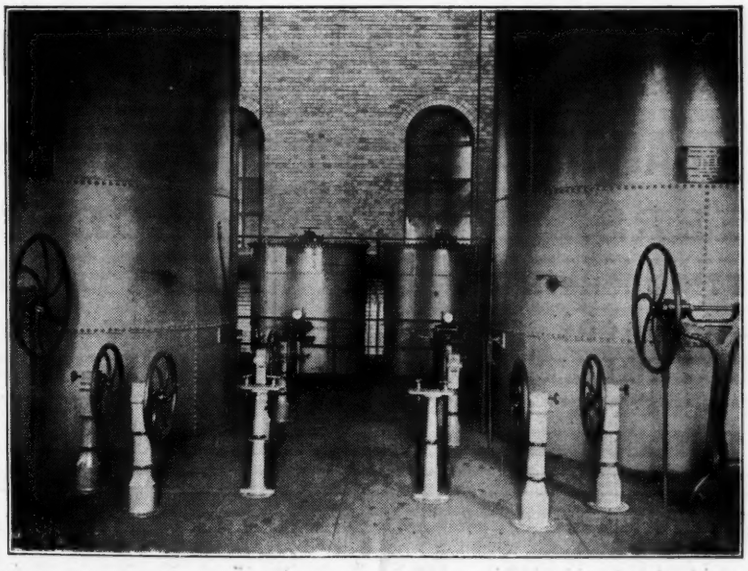

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COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The exceptionally mild weather which has prevailed during the present month has evidently had the effect of checking any further general upward move in prices, such as was being so generally talked of a week or so back; and neither in the neighbourhood of Manchester, nor in other Lancashire districts, will there be any official upward move in prices to-morrow, as had been anticipated in some quarters. For house-fire qualities, the demand has fallen off considerably. Prices are exceedingly strong at the full list rates of 12s. 6d. to 13s. 6d. per ton at the pit for best Wigan Arley, 11s. to 11s. 6d. for Pemberton four-feet and seconds Arley, and 10s. 6d. for common house coal. For other descriptions of fuel, the demand is fully maintained; common round coal being in brisk request, with supplies rather below than above the market inquiries, while engine fuel continues scarce, except in one or two isolated instances. Both for steam and forge coals and engine fuel prices are very firm, with a hardening tendency. At the pit, good qualities of steam coal are scarcely quoted under 10s. per ton; while for slack the minimum rate is about 5s. 9d. to 6s. 3d. for commoner scrts, 6s. 6d. to 7s. for medium, and 7s. 3d. to 7s. 6d. for the very best descriptions. For shipment, there has been a more active inquiry; and with supplies short, owing to the pressing inland demand, prices tend steadily upwards—10s. 6d. to 11s. per ton being now the minimum quotations for ordinary qualities of steam coal delivered at the ports on the Mersey. Coke remains without any official advance; but with the demand in excess of the production, prices are hardening upon all new business. For furnace coke, 20s. to 22s. has been obtained; and foundry coke is not quoted under 27s. at the ovens.

Northern Coal Trade.—There is increased firmness in the coal trade; and in some instances prices have advanced—partly through a larger home demand, and partly owing to the increased exports of coal. Best Northumbrian steam coals are now from 11s. to 11s. 6d. per ton f.o.b.; second-class steam are 10s. 9d., and steam smalls about 7s. 3d. In the gas coal trade there is a very full inquiry; and the price is nominally higher. But there is very little coal that is not contracted for, so that the sales are few. From 11s. 6d. to 12s. per ton f.o.b. is the current quotation for best Durham gas coals, for occasional cargoes, when obtainable. There is no alteration of moment in the price of other kinds of coal. For coke, the demand is very strong, and prices firm. Gas coke is now in larger supply; but the manufacturing consumption is full, and the stocks do not increase rapidly. The price quoted for gas coke is about 13s. 6d. per ton f.o.b.

Scotch Coal Trade.—There is a good demand for all classes of coal; and prices are, if anything, firmer. The miners are working steadily five days a week. The prices quoted are: Main 9s. 3d. per ton f.o.b. Glasgow, ell 10s. 3d. to 10s. 9d., and splint 10s. 6d. to 10s. 9d. The shipments for the week amounted to 180,651 tons—a decrease of 16,211 tons upon the previous week, and of 15,836 tons upon the corresponding week of last year. For the year to date, the total shipments have been 7,160,361 tons—a decrease of 670,980 tons upon the same period of last year.

Reduction in Price.—The Wexford Gas Consumers' Company, Limited, have reduced the price of gas for ordinary consumption from 3s. to 2s. 10d. per 1000 cubic feet, and for gas-engines and bakers' plates consuming not less than 25,000 cubic feet per quarter, to 2s. 7d.—both rates free of meter-rent. The reduction took effect on the 1st inst.

Gas-Works Improvements at Dorchester.—The Directors of the Dorchester Gas Company have for some time past had under consideration plans and suggestions prepared by Mr. W. A. M'Intosh Valon for the enlargement and improvement of their works. They have now decided to carry out the work as suggested, and will shortly commence erecting a new retort-house fitted with regenerator furnaces on the "Valon" plan, and other work in connection therewith. Messrs. R. & J. Dempster, Limited, are supplying new sulphate plant.

The Bradford Corporation and the Local Gas Companies.—At the meeting of the Bradford City Corporation last Friday the Town Clerk (Mr. J. Harrison) was authorized to take the necessary steps for applying to Parliament in the ensuing session for powers respecting the following (among other) subjects: To purchase the undertakings of the North Bierley, Airedale (Idle), Eccleshill and Bolton, and Clayton, Allerton, and Thornton Gas Companies, and to purchase gas in bulk from the Drighlington and Gildersome Gaslight Company for the purpose of enabling the Corporation to supply direct the citizens in Tong. It was also resolved—"That, in addition to making application to Parliament for power to purchase gas in bulk from the Drighlington and Gildersome Gaslight Company, Limited, for supplying Tong, application be also made for power to purchase gas in bulk from the Shipley Gaslight Company and the Pudsey Coal-Gas Company, to enable the Corporation to supply direct the citizens in Frizinghall and Heaton and Thornbury and Tyersal."

Sales of Shares.—At the Mart, last Wednesday, Mr. Alfred Richards sold £5000 of new ordinary stock of the Southend Gas Company (last dividend 5½ per cent.), at prices ranging from £118 10s. to £123 10s. per £100 of stock; 400 £10 "B" shares in the Grays Gas Company (last dividend £5 12s. per cent.), at £12 2s. 6d. and £12 5s. each; some £5 original shares in the West Ham Gas Company, at £11 10s., £12, and £12 5s. apiece; and some £10 fully-paid ordinary shares in the South-West Suburban Water Company (last dividend 4½ per cent.), at £13 15s. to £14 5s. per share. In accordance with the announcement made in recent issues of the "JOURNAL," Messrs. Pendered and Son sold by auction, at the Hind Hotel, Wellingborough, last Wednesday, 600 £10 ordinary "C" shares in the Wellingborough Gas Company (last dividend 9 per cent.), at prices ranging from £20 2s. 6d. to £21 5s. each. The total realized was £12,362 15s.; being an average of £20 12s. 1d. per share. At Southampton, 800 £10 new ordinary shares in the South Hants Water Company were recently disposed of. Several lots realized £17 3s. 6d. per share; and the average price was about £1 higher than at the last sale. At Maidstone, on Thursday, Messrs. W. Day and Sons disposed of five 4 per cent. preference shares of £10 each in the Maidstone Water Company, at £12 10s. each; fifteen ordinary 7 per cent. shares, at £15 apiece; and five others at £15 5s. each.

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The Glastonbury Corporation and the Gas-Works.—At a statutory meeting of the Glastonbury Town Council recently held, it was decided to promote a Bill next session for the acquisition of the gas-works; the expenses to be paid first out of the general district rate, and ultimately out of the money to be borrowed under the provisions of the Bill.

Retford Gas and Water Supply.—The annual report on the gas undertaking of the Retford Corporation shows that the expenditure on capital account during the past financial year was £1295, principally owing to providing a new coal-shed and an increased number of retorts and new meters. The gross profit was £2098 as against £3109 in the preceding year. The decrease was caused principally by the heavy expenditure charged to the reserve account for the renewal of the retort-bench, the reduction of 2d. per 1000 cubic feet in the price of gas, and 10s. per lamp for public lighting, and the increased cost of coal. The net profit for the year, after paying the instalments on account of the loans, is £683; and after adding to this the sum of £3292, the balance in hand of the net profit of the preceding years, and deducting the £1500 transferred to the capital account, the sum of £2476 is left to the credit of the profit and loss account. The water-rents in the past year amounted to £2571, as compared with £2481 for the preceding twelve months. The net surplus revenue, after paying all interest and instalments on account of prineipal, is £610, against £485; and the amount standing to the credit of the profit and loss account, after the transfer of £1500 therefrom to the capital account, is £1122 13s. 5d.

Carlisle Gas Workers and their Wages.—A branch of the Gas Workers' Union has recently been formed in Carlisle; and a meeting was recently held at which an endeavour was made to further its interests, in view of the slight support it has received. Mr. Lynas, Secretary for the north-eastern district of the Union, addressed the assembly, and said they would see the advantage of combination if they compared the conditions of labour in Carlisle with those obtaining in districts where there was organization of the workers. In Carlisle the gas-works were under municipal control. The men worked twelve hours a day for seven days, and he believed at the end of the week they were paid 30s. In South Shields they worked seven days of eight hours and got £2 0s. 6d.—a difference of 10s. 6d. a week, which was the result of combination among the workmen. He hoped they would see the necessity of combining and obtaining the concessions which had been granted in other places. Mr. Pete Curran said the Carlisle men were working for about 5s. 6d. less per week than the average wages of provincial gas workers, who, as members of the Union, were working eight hours a day. If the gas workers of Carlisle refused to make any organized effort to secure the conditions which prevailed in other towns and cities, he would not, were he a member of the Council, lift a finger to help them, and he did not see why any man should. On the other hand, if they were organized, and remained unanimous until after next new year, he could say without hesitation that they would be able, in the face of the most reactionary Council, to obtain the same rate of wages as in other cities. After explanations had been made as to the terms of membership of the Union, the meeting terminated.

Improved Water Supply for Adel.—The development of Adel, a pretty suburb of Leeds, has not progressed as it should have done, owing to the inadequacy of the water supply. This defect has now been remedied by the Leeds Corporation, within whose district the town lies, who have laid the necessary mains, and have furnished a supply of water from their reservoirs. The outlay has been small in comparison with the benefits conferred.

Scarcity of Water in South Wales.—Although we are supposed to have passed through the season of drought, there is great scarcity of water at Llanelly owing to the absence of rain. The water-level at the reservoir had fallen so low on the 21st inst., that the supply to the public works was completely cut off. The scarcity of water threatens to deprive a large number of workmen of employment. The engine-tanks at the station have also been disconnected from the reservoir, and storage-tanks are being sent from Paddington. It appears that considerable waste has been going on, owing to consumers allowing the water to run day and night; and Mr. Tregoning, at an informal meeting of the Town Council following the Harbour Commissioners' meeting on Monday last week, thought it incumbent upon him to warn the inhabitants that unless it was stopped the town might find itself in a very serious predicament. On the same day, much indignation was expressed throughout the higher portion of Swansea at the action of the authorities in cutting off the water supply without adequate notice. Late in the day the bulk of the inhabitants received a printed notice stating that the supply in the districts receiving a constant service would be restricted to five hours daily.

Liverpool Water Supply.—At a recent meeting of the Water Committee of the Liverpool Corporation, Alderman Radcliffe referred to the sources of the Liverpool water supply—Rivington and Vyrnwy. He said that one important event of the past year, which occupied the attention of the Committee for several months, had been the purchase of the Anderton Hall Estate, for the protection of the Rivington watershed. The erection of a huge hospital for pauper epileptics on the margin of the Rivington reservoir would undoubtedly have had the effect of seriously depreciating the value of these important works. Fortunately the danger had been averted; and it was to be hoped that Liverpool would be able to maintain in the future, as in the past, the high standard of purity which characterized the Rivington water. He went on to say that more than a year's experience had now been had of the arrangement made with Professor Boyce for the systematic bacteriological examination of the water supplied to Liverpool. In addition to the usual fortnightly and monthly examinations, there had been frequent special ones during the year to test the working of the filter-beds at Rivington and Oswestry, and to show the effect of storage in the reservoirs around Liverpool. Examinations had also been made as to the character of water standing in the dead-ends of mains under conditions which did not permit of constant movement. Altogether, nearly 600 separate bacteriological examinations had been made by Professor Boyce; and the conclusions deduced were that the water delivered to the inhabitants of Liverpool was unsurpassed in quality, and was throughout all seasons absolutely free from pathogenic germs.

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Keighley Water Supply.—At the meeting of the Keighley Town Council last Tuesday, Alderman Brigg, referring to the accounts of the Water Department for the year ended June 30, 1899, said that the cost had remained the same during the past as in the previous year. The receipts had increased by some £400, entirely from water-rents, the amount received for water sold by meter remaining about the same as before. The most satisfactory feature of the accounts was that, for the first time in the history of the Water Committee, the revenue from the sale of water had met all the expenses of management, paid the interest on the whole of the borrowed money, provided the necessary sinking fund, and left a small surplus without in any way entrenching on the rates.

The New Holder at the Ripon Gas-Works.—The new gasholder which, as recorded in the "JOURNAL" last week, Messrs. W. C. Holmes and Co., of Huddersfield, have lately erected at the Ripon Gas-Works—this being the completion of the extension scheme which has been carried out by the Corporation during the past year under the supervision of their Gas Manager (Mr. E. E. J. Anderson)—is 40 feet high, and has a capacity of 168,000 cubic feet; the tank being 62 feet in diameter, and 21 feet deep. Hitherto the holder capacity has only been for 90,000 cubic feet; and during the winter months, when the daily make is 150,000 cubic feet, much of the gas was sent into the town direct from the purifiers. With the new holder, and larger mains laid all over the city, there will now be a continuous and steady supply at good pressure in all districts alike. It is considered that the ability with which the whole scheme has been carried out augurs well for the cheapening of gas in the future.

Accidental Poisoning by Coal Gas Escaping from a Chandelier.—At the Wandsworth Town Hall, last Saturday, Mr. A. Braxton Hicks held an inquiry with reference to the death of Johann Geyer, aged 58 years, a medical rubber, lately residing at No. 8, St. Anne's Road, Wandsworth, who was found dead in his bed on the previous evening. Charles Neale, a School Board teacher, identified the deceased as his father-in-law, and stated that he had lived alone since he lost his wife four years ago. On the evening in question, some of the neighbours complained that gas was escaping from Mr. Geyer's house, and witness, obtained the assistance of a police sergeant, and effected an entry. They found it full of gas. On going into the deceased's bedroom, he found a small gas-jet near the window alight; but below the bed the room was full of gas. The deceased was dead and cold. In the back parlour they found that the chandelier had fallen from the ceiling through the chains being eaten with rust, and the gas had been escaping from the open pipe. Dr. Charles M'Dade, who was called in, said the deceased had been dead about twelve hours. Upon making a *post mortem* examination, witness found all the characteristics of poisoning by coal gas, which was the cause of death. It was a very singular case The Coroner said the painful occurrence ought to direct the attention of householders to their gas-chandeliers, as the chains were very apt to become rusty. It was fortunate Mr. Neale entered the house when he did, or there would undoubtedly have been a serious explosion. The Jury found that the deceased was poisoned by coal gas, through a defective chandelier, and returned a verdict of "Accidental death."

Water Scheme for Bungay.—The necessity for a proper water supply system for Bungay has long been felt; and a scheme is now on foot for securing one. The area over which it is proposed that the supply shall extend comprises Bungay, Harleston, Halesworth, Saxmundham, Eye, and other smaller places in the immediate neighbourhood. The promoters have made application to the various local authorities concerned, with a view to ascertain whether they have any opposition to offer to the scheme; and the matter is now being considered. It is intended to promote a Bill next session to obtain the requisite powers for carrying out a scheme of water supply.

The Derwent Valley Water Board.—The first meeting of the Board has been summoned to be held at Derby on Thursday, the 16th prox., to make the preliminary arrangements to carry out the Derwent Valley water scheme. The Board consists of thirteen members—three from the Town Council of Derby, four members of the Leicester Corporation, three members of the Sheffield Corporation, two members of the Nottingham Town Council, and one member of the Nottingham County Council. The business will be: To appoint a Chairman, Deputy-Chairman, Standing Arbitrator, and other officials; to determine the time and place of future meetings; to appoint committees and define their duties; to order steps to be taken to ascertain the rainfall for purposes of compensation water; and "to take such steps as may be necessary for the construction of the first instalment of the works to be completed under the Act of last session."

The South Metropolitan Gas Company and the Reservists.—The workmen employed by the South Metropolitan Gas Company have formulated a scheme to afford the necessary assistance to the wives and children of men engaged at the Company's different stations who have been called upon to rejoin the army as reservists. Meetings of the men at the various stations have been held, and it has been agreed to authorize the pay clerks to deduct 1d. weekly from each man's wages. The sum thus contributed—estimated to produce £12 10s. per week—will be augmented by a contribution by the Company themselves of a similar amount. The proposal is that the wife, parent, or other dependent of a reserve man called upon to rejoin his regiment, be paid 10s. per week, and each child under 15 years of age 2s. per week, until such time as it is considered necessary to amend this scale. It has been further determined that all surplus money shall be deposited each week in the profit-sharing scheme, in the names of the Trustees and Hon. Secretary to form a reserve fund to meet such other requirements as may arise. After careful investigation, it has been found that there will be 29 adult dependents upon the fund and 28 children. This will absorb £17 6s. out of the £25, and leave a surplus of between £7 and £8 to meet any additional claims that may come upon the fund owing to the death of any of the men who have rejoined the colours, or to meet any greater demands that might be made upon the fund in the event of any men being removed from work in consequence of some divisions of the militia having been called up. The disposition of the fund is to be left entirely in the hands of a Committee of the men, nine of whom have been selected for the purpose, with Mr. E. W. Gilbert as Hon. Secretary.

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Water Supply for Rainford.—On Saturday, the 21st inst., the township of Rainford was furnished with a supply of water by the St. Helen's Corporation, under a scheme prepared by Mr. J. J. Lackland, their Water Engineer. The water is sent from the Corporation pumping-station at Eccleston Hill to a reservoir which has been constructed to hold 100,000 gallons at a place called Red Cat, whence it flows by gravitation to the township. The water was turned on by Mrs. Boardman, wife of the Chairman of the District Council, amid general expressions of satisfaction; and that lady was presented with a handsome gold bangle, suitably inscribed, as a memento of the occasion. The scheme has cost £6000.

Rhyl Water Supply.—The Rhyl Urban District Council are taking steps to promote a Bill in Parliament for constructing a new reservoir at Llannefydd; and the matter came up for discussion at a special meeting of the Council last Wednesday. The resolution agreed to was to promote a Bill in the next session of Parliament for the construction of additional water-works and the improvement of the water supply to Rhyl and places adjoining. Mr. Mostyn Williams, in the course of the proceedings, proposed that the Council also seek powers to levy an increased water-rate, as there was a loss of about £200 per annum on the water, and a deficiency which had not been cleared off. The new works would, he said, require an outlay of at least £12,500, which would mean a new annual charge of £500. Captain Keatinge led the opposition to the proposal to increase the price of water, and said that Rhyl was growing so rapidly that the additional charges would be met by the additional revenue. Besides this the Council when they bought the works offered the outside district better terms than the old Company, and so secured the powers. They could not, in fairness, go back on the arrangement then made. After a heated discussion, the proposal was defeated by 7 votes to 5; and subsequently a member moved to insert a clause in the resolution shutting out the question of the water-rate; but the Town Clerk ruled that the resolution was useless, as there was not an absolute majority of the Council in favour of it. Ultimately the proceedings ended in a deadlock; several councillors leaving the room. Captain Keatinge declared that he would wreck the Bill rather than vote for an increased rate; and it was then decided to hold an adjourned meeting on the subject.

Shocking Accident at a Manchester Gas-Works; Mr. Stevenson Killed.—Just as the "JOURNAL" this week is being made up for press, news is received that an explosion by which thirteen persons were injured and an enormous amount of damage was done to property, occurred at the Rochdale Road works of the Manchester Gas Department yesterday forenoon. Some improvements were being carried out, in the course of which an old main pipe, which has not been used for some time, was disturbed. A few minutes later a loud explosion took place, which, for the moment, created the utmost consternation, not only among the workmen, but in the neighbourhood for a considerable distance round. It was immediately seen that a large and substantial building, known as the clock tower, was on fire—flames darting out in every direction. The City Fire Brigade were communicated with; and as quickly as possible steamers were got to work, pouring an immense quantity of water on to the burning structure. The connections were cut off in various directions; but in spite of this many thousands of cubic feet of gas caught fire, to the imminent danger of a large mass of property in the locality. Ultimately, the flames in the clock tower were extinguished, but not until the lower floor had fallen in with a crash, and a meter-house had been completely burned down. A portion of the fire-brigade kept up a continued deluge of water on the fractured main; but for a long time their efforts were apparently useless—great tongues of flame constantly flaring out from it and from the site of the old meter-house. In the end, the main whence the flames were fed, was ordered to be cut. The greatest fears were at one time entertained lest the clock tower, which was in an undermined and ruined condition, should fall upon a large tank containing about 500,000 cubic feet of gas, which would thus have been set free just over the spot where the main was on fire. The officials are unable to say how the accident happened; but it is surmised that while the gas was being transferred from an old to a new meter at the opposite end of the works a stream must have come in contact with a naked light, probably in the clock tower, and thus have set it on fire. Eleven men were engaged on the work, under the superintendence of Mr. G. Ernest Stevenson, the Manager, and Mr. James Hill, the Department Manager. The whole of them were seriously injured; Mr. Stevenson being frightfully burned and cut about the head. They were all conveyed to the Infirmary, with the exception of Mr. Hill, who, though badly damaged about the head and hands, was able to go to his own house. Most of the men were able to leave the Infirmary last night and return to their homes; but the injuries which the others had sustained were so serious as to necessitate their detention in the institution. Mr. Stevenson never rallied; and it is with much sorrow we have to announce that he died during the afternoon.

Bolton Water Supply.—Dr. G. S. Buchanan and Mr. R. H. Bicknell have reported to the Local Government Board upon their inspection of the gathering-grounds and water-works of the Corporation of Bolton. In some general observations they say: "The Bolton Corporation purvey water to a quarter of a million population, and derive a large profit from their water undertaking. They have added to their water-works at sundry dates, and have constructed filter-beds and reservoirs; on certain parts of their gathering-areas, notably at Heaton, they have culverted streams, and done other work of a similar character; and on their Entwistle area in particular they have now purchased a considerable part of their gathering-ground. But while credit may be given to the Corporation for action in the above sense, the facts indicate that in several important respects they have neglected to take adequate precautions for safeguarding the purity of the water they supply. We cannot doubt that the conditions found by us on each of the three gathering-grounds are attended by risk of dangerous pollution of the water derived from them. And although the bulk of the water obtained from these gathering-grounds is filtered before reaching the consumer, it would seem that the filtration which is practised can by no means be depended upon to uniformly remove this risk. Opportunities of pollution, such as we have indicated, are not difficult of detection; and the negligence which we think attributable to the Bolton Town Council in the matter lies in their having made little effort to obtain systematic information of objectionable conditions obtaining upon their gathering-grounds and water-works."

Messrs. Newton, Chambers, and Co., Limited, have been successful with their tender for purifying extensions at the Rotherham Corporation Gas-Works. The amount of the contract is £1467.

The Stone Gas Company have found it necessary to extend their purifying plant, and have placed the order for four new purifiers, roof, &c., with Messrs. R. Dempster and Sons, Limited, of Elland.

The estimates which the Finance Committee submitted at the last meeting of the Yeadon District Council contained an item of £600 for costs incurred in opposing the Gas Company's Bill last session.

It is claimed that the deepest oil well in America is situated in the Monongahela River Valley, about 25 miles from Pittsburgh. The hole has been drilled to a depth of 5532 feet; but it is proposed to sink the well 6000 feet.

Under the auspices of the Cobham District Gas Company, Messrs. John Wright and Co. held an exhibition of gas cooking and heating apparatus in the Village Hall, Cobham, from Tuesday to Friday last week, with cookery lectures by Miss Ball.

The Blast-Furnace Power Sandicate, Limited, has been formed with a capital of £100,000 in £1 shares, to acquire any patents, patent rights, inventions, secret processes, &c., relating to the production, accumulation, transmission, or utilization of power of any kind.

Among several important contracts recently entrusted to Messrs. Willey and Co., of Exeter, are two in the Metropolitan area—one for a three-lift gasholder, 145 feet in diameter, for the Wandsworth and Putney Gas Company, and another for the Epsom and Ewell Gas Company, at a total cost of £20,000.

In connection with the water supply and sewage-disposal scheme, Mr. W. A. Valon visited Falmouth a few days since for the purpose of meeting the members of the Corporation Sanitary Committee. After hearing Mr. Valon at considerable length, a resolution was passed giving him a comparatively free hand with the whole matter.

Among the contracts in the hands of Messrs. R. & A. Main, Limited, of Glasgow, is one for the supply of the whole of the apparatus for cooking by means of gas, coal, and steam at the new Majestic Hotel, Harrogate. It includes a unique coal-range, 19 ft. 6 in. long, with five fires and ten ovens; also steam-jacketed pans, &c. The firm have just fitted up the still-room at the Carlton Hotel, London, with an exceptionally fine cooking apparatus for gas, steam, and coal; including the largest single gas-oven ever made by Messrs. Main.

The Winstanley Speciality Company, of Coventry, have secured the order for reconstructing the whole of the carbonizing plant of the Wellington (Salop) Gas Company. The work involves the clearing away of all the existing bench of retorts, and completely transforming the work on modern lines, including the erection of regenerative settings. The new carbonizing plant will practically enable the Company to manufacture double the quantity of gas on the same space as is at present occupied by the old settings. The same Contractors have also been successful with their tender for the supply and erection complete, in the new retort-house of the South Shields Gas Company, of the retort-bench, settings, and chimneys, including all ironwork, floors, &c. Before this order was placed, exhaustive inquiries were made as to the efficiency, work, &c., of several designs.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.

ANDREW STEPHENSON, AGENT. All communications re Oxide to the Company as above.

WINKELMANN'S
"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for use in GAS-WORKS.
ANDREW STEPHENSON,
182, Palmerston Buildings,
Old Broad Street,
"Volcanism, London." London, E.C.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM; and 45 & 47, Westminster Bridge Road, LONDON, S.E.
First-Class Award, Melbourne Exhibition, 1899, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

SULPHURIC ACID.
JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

SEASON 1899.

BALE'S OXIDE OF IRON, of finest Quality. Summer delivery specially recommended for efficiency and economy.
FIRE CEMENT, PAINT, and CHEMICALS.
120 and 121, NEWGATE STREET, LONDON, E.C.

SADLER & CO., Ltd., Middlesbrough, Tar Distillers and Tar Colour Manufacturers. BENZOL specially prepared for Gas Enrichment free from Sulphur. Pure Hydrated OXIDE OF IRON for Purifying Gas either for Sale or Lent on Hire. Always Buyers of GAS TAR and AMMONIACAL LIQUOR.

CANNEL, COAL, ETC.
JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, or NEWTON GRANGE, NEWBATTLE, DALKEITH, SCOTLAND.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

SHEFFIELD CHEMICAL COMPANY, LIMITED.
BUYERS of Spent Oxide. Sellers of OXIDE OF IRON and SULPHURIC ACID.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER, LINCOLN."
[For Illustrated Advertisement, see Oct. 3, p. 842]

BROTHERTON & CO.
Offices: Commercial Buildings, LEEDS. Correspondence invited.

IRON OXIDE (Bog Ore), best quality, for the Purification of Gas, containing up to 85 per cent. Hydrated Oxide of Iron, and absorbing while being used a high percentage of Blue.
S. BOWLEY AND SON, Wellington Works, Battersea Bridge, LONDON, S.W.

SULPHURIC ACID for Sale.
BROTHERTON AND CO., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

GAS CARBON Wanted, not less than 4-Ton Loads.
Apply to the BRIMINGTON CARBON COMPANY, Sowerby Bridge, YORKS.

WANTED, an Engagement by the Advertiser, a GAS MANAGER, with extensive Home and Colonial experience, who will be disengaged in the early part of the month of October. Well up in all the details of modern Gas-Works Construction and its Management, and the most approved Appliances introduced to economize the production of Gas and extend its use. Practically acquainted with both American and German Carburetted Water-Gas Plant and its manipulation. A good Draughtsman and Accountant. Satisfactory References and Testimonials.
Address No. 3332, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, Cost Keeping Clerk.
Apply to JONAS DRAKE AND SON, Gas Engineers, and Contractors, Ovenden, HALIFAX.

WANTED, at once, an Under Stoker.
Wages 31s. 6d. per week of seven days. Sunday out given. None but steady Men need apply.
Apply to the DORKING GAS-WORKS.

WANTED, a steady and reliab'e Man as STOKER for a small Gas-Works in Dorset. Make 5 millions; two Men kept. State Wages.
Apply, by letter, to No. 3371, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a steady Young Man used to Services, Cookers, Ordinary and Automatic Meters, and Gas-Fitting in Private Houses.
Applications, stating Age, Wages required, and all Particulars to WM. SEVERS, Engineer and Manager, Gas-Works, Wilmslow, MANCHESTER.

WANTED, a good all round Fitter, used to Services, Cookers, Ordinary and Automatic Meters, and the fitting up of Houses.
Applications, stating Wages required, Testimonials, &c., to be sent to the MANAGER, Gas-Works, Ascot, BERKS.

WANTED, by a Firm of Gas Engineers, an experienced DRAUGHTSMAN, well up in estimating and preparing Working Drawings.
Apply, stating Age, and Wages required, with References, to No. 3367, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WORKS Manager wanted by a Firm of Gas Engineers and Contractors in South Yorkshire. Must be practical, accustomed to control Men, and have experience in all classes of work passing through the different departments, including Mechanic's, Pattern, Moulding, and Smith's Shops. Liberal Salary to competent Man.
State (by letter) Age, Experience, and Salary to No. 3363, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a Provincial Gas and Water Company, Young Man as ASSISTANT in the DISTRIBUTING DEPARTMENT. One with a knowledge of Plumbing preferred. He must be of good address, have a thorough knowledge of Cooking and Heating Appliances, and be able to advise and deal with Consumers on all matters appertaining to Gas and Water Supply.
Salary about £120 per annum according to Qualifications.
Applications, with *copies* of not more than Three recent Testimonials, to be addressed to No. 3364, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

PATENTS FOR INVENTIONS.
Messrs. J. C. CHAPMAN & CO., Chartered Patent Agents, ADVISE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

AMMONIACAL LIQUOR wanted.
BROTHERTON AND CO., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

PRACTICAL RETORT SETTERS.
BATES & NUTTALL, 32, Havelock Road, Saltley, Birmingham.
Regenerator or other Furnaces erected to Engineers' own Designs. Best Work Guaranteed. Please write for Estimates.

SPENT OXIDE wanted.
BROTHERTON AND CO., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

ENRICH your Gas with cheap Benzol.
Specially prepared, free from sulphur. At to-day's Price of Benzol, ILLUMINATING POWER costs less than ONE-THIRD OF A PENNY PER CANDLE.
Apply to SADLER AND CO., MIDDLESBROUGH.

GAS TAR wanted.
BROTHERTON AND CO, Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

MELROSE CYCLES
SHOULD be bought by Gas and Water Officials. Ladies' No. 1, £10 10s.; No. 2, £8 10s. Gents' No. 1, £10; No. 2, £8. Highest Quality. Twelve Months' Guaranty. Sent on approval. Catalogue free. MELROSE CYCLE COMPANY, COVENTRY.

GAS MANUFACTURE EXAMINATION.
STUDENTS prepared for the City and Guilds Examination by a practical, qualified Teacher, Ordinary or Honours Grade. Splendid success; three Seasons, three Medals.
Address No. 3372, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

STOKERS Wanted, used to Shovel Charging. Wages 31s. per week.
Apply to BENJAMIN BARK, Gas-Works, GODALMING.

WANTED, by the Elland Gas Company, a practical MAIN and SERVICE LAYER; also BLACKSMITH. Permanent employment.
Apply to the MANAGER, Gas-Works, ELLAND.

WANTED, an experienced Stoker, used to Shovel Charging, capable of attending to Engine and Exhauster, and acquainted with the general routine of Gas Manufacture and Plant. Wages 35s. per week. Abstainer preferred.
Apply, in own handwriting, to R. DARNEY, Gas-Works, FAVERSHAM.

NEW SWINDON GAS COMPANY.
WANTED, by the above Company, a thoroughly practical Man as WORKS' FOREMAN. Age not to exceed 35. Will be required to live on the Works.
Applications, stating Qualifications and Salary required (exclusive of House, Coal, and Gas), to be sent in to the undersigned not later than Saturday, Nov. 4, 1899.
JOHN J. JERVIS, Secretary.
New Swindon Gas Company, Swindon, Wilts.

COUNTY BOROUGH OF BLACKBURN.
ASSISTANT GAS ENGINEER.
THE Gas Committee of the Corporation of Blackburn are prepared to receive APPLICATIONS for the position of ASSISTANT GAS ENGINEER.
Any Person applying will be required to have had a thorough training in Gas Manufacture, Purification, and Distribution, together with a Practical knowledge of Sulphate Making. He must also be able to prepare Plans and Specifications for any intended New Works.
Applicants must be over 25 Years and not over 30 Years of Age.
Salary to commence at £150 per annum, and to increase by five annual Increments to £200 per annum.
Applications, enclosing not more than Three recent Testimonials, to be sent, addressed to the Chairman, properly endorsed "Assistant," not later than Saturday, Nov. 11, 1899.
Canvassing any Member of the Council will be considered a disqualification.
By order,
S. R. OGDEN, Gas Engineer.
Gas-Works, Blackburn, Oct. 18, 1899.

BENZOL, specially made for the Enrich- ment of Gas.
ELLISON AND MITCHELL, LIMITED, Kilnhurst, near ROTHERHAM.

NEW GAS PLANT CEMENT.
JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS, MANCHESTER.
For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

SULPHATE OF AMMONIA SATURATORS.
JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special attention to Repairs.
Before placing Orders, please write for Estimate.
Telegraphic Address: "SATURATORS, BOLTON."

WANTED, an experienced Foreman RETORT-SETTER for large Gas-Works in Yorkshire. Regular employment for suitable Man.
Apply, by letter, to No. 3368, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS-WORKS.
MANAGER wanted for Small Works, now making about One-and-a-Half Millions. Output to be doubled shortly. Must be a very energetic, quick worker, and able to lay in Services, superintend Main Laying, &c.
Apply, by letter, to No. 3369, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WATER-WORKS.
COUNTRY Water-Works requires Man for Tapping Mains, Laying in Services, &c. Must be a good Workman.
Apply, by letter, with *copies* of Testimonials, and stating Wages required, to No. 3370, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

RETORT-HOUSE Foreman wanted, for Works in Midlands making about 140 Millions per annum. Applicants must have had thorough practical experience of the working of Regenerative Furnaces, also Engines, Boilers, &c., and be capable of taking sole charge at night. Wages, £2 to £2 2s. per week, according to Qualifications.
Apply, by letter, stating Age and previous Experience, to No. 3375, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WORKING Foreman or Leading Stoker wanted at once, by a Gas Company on the Coast in the West of England. Must be thoroughly competent to take charge of the Retort-House, Boiler, Exhausters, and Works generally. One accustomed to Shovel Charging and Regenerative Furnaces preferred. None but fully qualified, steady, and reliable men need apply. Alternate weeks, Night and Day Shifts. Wages from 27s. to 30s. per week.
Apply, by letter, to No. 3374, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

THE Sittingbourne District Gas Com- pany require the services of an experienced ENGINEER and MANAGER for their Gas-Works. He must be capable of Designing and Superintending the carrying out of extensions, and competent to undertake the entire control of the Works, Mains, and Services, and the supervision of the Manufacture of Gas and Sulphate of Ammonia. Salary £180, with Residence, Coal, and Gas free. The duties to commence the 1st of January next.
Applications, stating Age, Experience, present Employment, &c., accompanied by *copies* of not more than three recent Testimonials, to be sent to the undersigned, on or before the 6th day of November, 1899.
W. J. HARRIS, Secretary.
Sittingbourne, Oct. 21, 1899.

FENTON URBAN DISTRICT COUNCIL.
GAS MANAGER.
THE Gas Committee require the services of a thoroughly competent GAS MANAGER, at a Salary of £200 per annum, to take charge of their Gas-Works (80 million cubic feet made per annum).
Applications, in Candidates' own Handwriting, with full Particulars as to Age, Training, and Experience, accompanied by not less than three *copy* Testimonials of recent date, to be sent to me (marked "Gas Manager"), not later than Saturday, the 11th prox.
Canvassing, either directly or indirectly, will disqualify.
By order,
CHAS. ADDERLEY, Clerk.
Town Hall, Fenton, Staffs., Oct. 27, 1899.

IRON ROOF for Sale, 132 feet long by 53 ft. 4 in. Span, in first-class condition.
Apply to CLAYTON, SON, AND CO., LIMITED, Hunslet, LEEDS.

ENGINE and Exhausters, 20,000 and 30,000 cubic feet per hour, delivered immediately. Cheap to clear.
J. F. BLAKELEY, Thornhill, DEWSBURY.

CAST Tank, 31 feet diameter, 12 feet deep, £4 15s. per ton. Straps and Bolts included. Five Years old.
J. F. BLAKELEY, Thornhill, DEWSBURY.

FOR SALE—Gas-Making Plant, complete, and in good working order. Suitable for Country Mansion, or small Village.
Capacity and all Particulars on application to ESTATE OFFICE, Wadhurst Park, Wadhurst, SUSSEX.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

FOR SALE, owing to Extensions—
A SINGLE-LIFT GASHOLDER, with Cast-Iron Tank, 37 ft. 6 in. diameter and 12 ft. deep.
A LIVESEY WASHER, capacity 100,000 cubic feet per day, with 8-inch Inlet, Outlet, and Bye-Pass Valves and Connections.
All in perfect condition.
For further Particulars, apply, by letter, to No. 3873, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE, in excellent condition—
SULPHATE OF AMMONIA PLANT (Schwab's "Champion").
Vertical SCRUBBER-WASHERS, 15 ft. 6 in. by 5 ft. 9 in.
CONDENSER (38 pipes), 10 ft. by 4 ft. 6 in.
VALVES (Donkin), 8 inches and 15 inches diameter.
VALVES (Laidlaw), 10 inches and 18 inches diameter.
CENTRE-VALVE (Walker), 18-inch.
Large variety of other VALVES and PLUG COCKS.
GAS GOVERNORS, 6 in., 8 in., and 9 in. Connections.
STATION METERS, 4 in., 5 in., and 6 in. Connections.
PURIFIERS from 15 to 144 feet area.
D. M. NELSON AND CO. (Tel. Ad. "Gas"), GLASGOW.

THE Perth Gas Commissioners are prepared to receive TENDERS for the construction and erection of the IRON and STEEL ROOFING of the Retort-House, Coal-Store, and other Buildings, and for the construction of a High-Level Railway at their new Gas-Works, Friarton, Perth.
Specifications of the necessary Works may be obtained from Mr. A. Gillespie, 34, St. Enoch Square, Glasgow, on and after the 3rd of November next.
Plans of the Works may be seen at the Office of Mr. Gillespie, and intending Offerers may obtain Copies of the Plans on payment of 10s. for the set.
Sealed Tenders to be delivered to the undersigned on or before Saturday, the 18th of November, 1899, marked "Tender for Iron Roofing, &c."
JOHN BEGG,
Clerk of Gas Commissioners.
City Chambers, Perth,
Oct. 27, 1899.

LLANDUDNO URBAN DISTRICT COUNCIL.

TO CONTRACTORS AND OTHERS.

THE Llandudno Urban District Council are desirous of obtaining TENDERS for the construction and erection of a new 120 feet diameter TWO-LIFT GASHOLDER, with TANK; also for VALVES, PIPES, CONNECTIONS, and New VALVE-HOUSE.
Plan and Particulars, which must be returned, may be obtained, on and after Monday, the 30th day of October, upon application, and upon payment of a fee of 10s. (which will not be returned), to the Council's Engineer, Mr. E. Paley Stephenson, Assoc.M.Inst.C.E.
Sealed Tenders, endorsed "Gasholder," to be delivered to the undersigned at the Council Offices before Noon on Monday, the 13th day of November, 1899.
The Council do not bind themselves to accept the lowest or any Tender.
ALFRED CONOLLY,
Clerk to the Council.
Urban District Council Offices,
Llandudno, Oct. 23, 1899.

FIRE-CLAY GOODS.

THE Directors of the Sheffield United Gaslight Company invite TENDERS for the supply of FIRE-CLAY GOODS (Retort Bricks, &c.) required at their Neepsend, Effingham Street, and Grimesthorpe Stations during the next Twelve Months.
Specifications and Forms of Tender may be had on application to the Company's Engineer, Mr. J. W. Morrison.
The Directors do not bind themselves to accept the lowest or any Tender.
Sealed Tenders, marked "Tender for Fire-Clay Goods," must be delivered by post to the undersigned not later than the first post on Saturday, Nov. 4.
HANBURY THOMAS,
General Manager and Secretary.
Commercial Street, Sheffield,
Oct. 14, 1899.

LEIGH URBAN DISTRICT COUNCIL.

THE Gas Committee invite Tenders for the supply of 90 Tons of NATURAL BOG ORE PURIFYING MATERIAL, and for the purchase of about 250 Tons of SPENT OXIDE OF IRON.
Forms of Tender and further Particulars may be obtained from the Manager, Mr. John Foster, Gas-Works, Leigh, Lancs.
Sealed Tenders, endorsed "New Oxide" or "Spent Oxide" (as the case may be), and addressed to me, the undersigned, to be delivered at the Town Hall, Leigh, Lancs., on or before Tuesday, the 14th day of November, 1899.
PEREGRINE THOMAS,
Clerk and Solicitor.
Town Hall, Leigh, Lancs.,
Oct. 26, 1899.

THE Barry Urban District Council are prepared to receive TENDERS for the erection of a THREE-LIFT GASHOLDER and STEEL TANK, on Concrete Foundation prepared by the Council.
The Tank will be 112 ft. diameter by 26 ft. deep; and the Gasholder: Outer Lift 110 ft. diameter, Middle Lift 107 ft. 6 in. diameter, and Inner Lift 105 ft. diameter—the Lifts being of relative depths in accord with the Tank.
The Council are open to consider and adopt any suitable system of Guiding the Gasholder, either by Standards, Wire Ropes, or Spiral Guides, as may be approved of by their Engineer. A Railway Siding, connected with the Barry Railway, runs into the Gas-Works, and may be used for the delivery of the Material, providing that no inconvenience is caused at the Gas-Works.
The whole of the work will have to be completed by the 31st of October, 1900, to the entire satisfaction of the Engineer.
Outline Plan and Site may be inspected between the Hours of Ten and One each morning, from Nov. 1 to Nov. 11 (the 5th, Sunday, excepted); and any further Information will be supplied by the Engineer, Mr. F. M. Harris, at the Gas-Works, at the hours referred to, or by letter, on those dates only.
Sealed Tenders, accompanied by Drawings and Specification, endorsed "Tender for Gasholder," to be addressed to the Chairman, Gas and Water Committee, Gas and Water Offices, Barry, Glamorgan, not later than Tuesday, the 14th of November, 1899.
The person whose Tender is accepted will be required to furnish approved sureties for the due performance of the work.
The Council do not bind themselves to accept the lowest or any Tender.
Barry, Glamorgan,
Oct. 28, 1899.

CROMER GAS COMPANY.

ISSUE OF £10,000 ORDINARY STOCK.

THE Directors of the Cromer Gas COMPANY hereby give notice that they are prepared to receive TENDERS for £10,000 ORDINARY STOCK to be issued under the Provisions of the Cromer Gas Act, 1898, and ranking for a Standard Dividend of 5 per cent. per annum. The last Dividend on similar Stock was at the rate of 4 per cent.
The Stock may be held in multiples of £1 with a minimum holding of £10, and will be registered in the Company's Books, and Certificates issued, free of any expense.
Tenders must be delivered at the Company's Office, Cromer, on or before Monday, the 13th of November, 1899, accompanied by a deposit of £10 per cent. on the Stock tendered for; the balance being payable on Allotment.
No Tender at a price below par will be considered.
Copies of the Company's Special Act may be seen at the Company's Office; and Particulars and Forms of Tender may be obtained of Messrs. Barclay and Co., Bankers, Lombard Street, London, and at Norwich and Cromer, or at the Company's Offices, Cromer.
By order,
P. E. HANSELL,
Cromer, Oct. 30, 1899. Secretary.

ISSUE OF STOCKS AND SHARES BY AUCTION UNDER PARLIAMENTARY POWERS.

MR. ALFRED RICHARDS undertakes the issuing by AUCTION of GAS AND WATER STOCKS and SHARES under Parliamentary Powers.
He also Holds MONTHLY SALES of GAS and WATER STOCKS and SHARES at the Auction Mart, Tokenhouse Yard, E.C.
Terms for the Issuing of Capital, and also for offering to Auction Gas and Water Stocks and Shares, and all Particulars relating thereto, may be had of Mr. ALFRED RICHARDS.
Offices: 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
WANDSWORTH AND PUTNEY GASLIGHT AND COKE COMPANY.

NEW ISSUE OF £7500 ORDINARY STOCK.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, E.C., on Tuesday, Nov. 7, at Two o'clock, in Lots,
£7500 OF NEW ORDINARY STOCK
in the above Undertaking.
Ranking for a Standard Dividend of 7 per cent., subject to the Sliding-Scale; the last Dividend on similar Stock in the Company having been 12½ per cent.
Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
HERNE BAY GAS AND COKE COMPANY, LIMITED.

NEW ISSUE OF 1000 £5 ORDINARY SHARES.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Nov. 7, at Two o'clock, in Lots.
Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Trustees of Mrs. Louisa Baynes (deceased), and other Owners.
NEWHAVEN GAS COMPANY, LIMITED.
SIXTY SHARES.
LEA BRIDGE DISTRICT GAS COMPANY.
100 £10 ORDINARY SHARES.
NORTH MIDDLESEX GAS COMPANY.
50 £10 ORDINARY SHARES.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Nov. 7, at Two o'clock.
Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
BARNET DISTRICT GAS AND WATER COMPANY.

NEW ISSUE OF £5000 "D" GAS STOCK.

Ranking for a Maximum Dividend of 7 per cent.; the last Dividend on similar Stock in the Company having been £6 6s. per Cent. per annum.

TO BE SOLD BY AUCTION BY

MR. ALFRED RICHARDS, at the Mart, E.C., on Wednesday, Nov. 29, at Two o'clock.
Particulars of the AUCTIONEER, as above.

By order of the Directors of the
SOUTHEND WATER-WORKS COMPANY.

NEW ISSUE OF 600 £10 ADDITIONAL ORDINARY SHARES.

MAXIMUM DIVIDEND 7 PER CENT.; LAST DIVIDEND 5½ PER CENT.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Wednesday, the 29th of November, at Two o'clock.
Particulars of the AUCTIONEER as above.

By order of the Directors of the
HARROW AND STANMORE GAS COMPANY.

NEW ISSUE OF 259 £10 "C" SHARES.

STANDARD DIVIDEND 7 PER CENT.; LAST DIVIDEND £5 12s. PER CENT.

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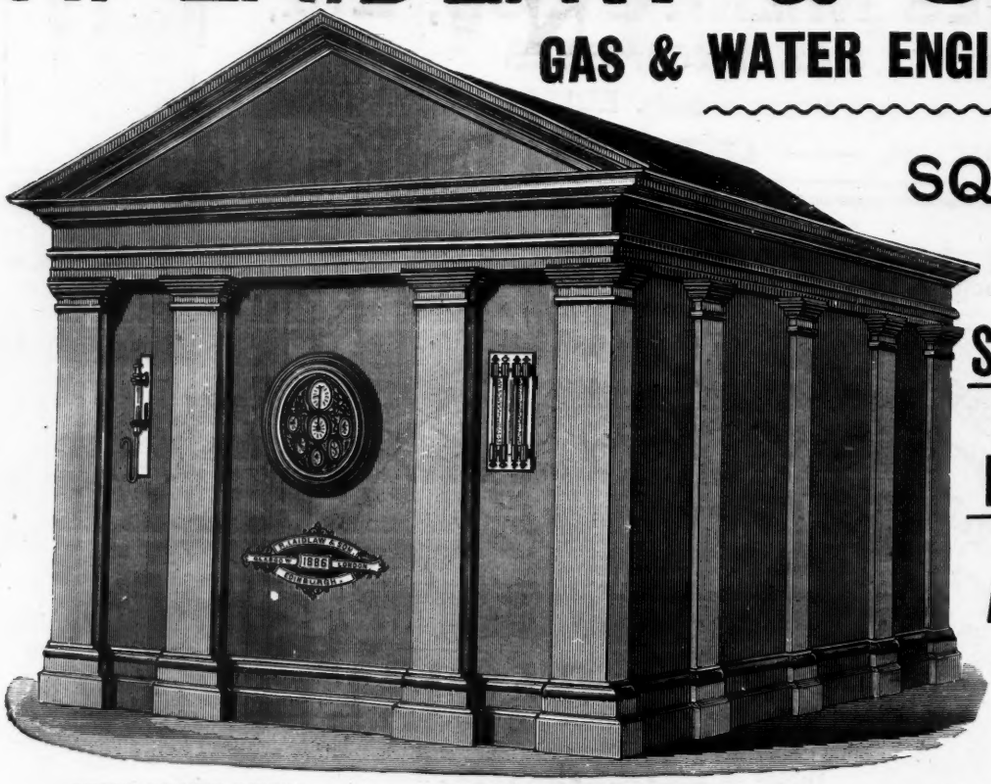

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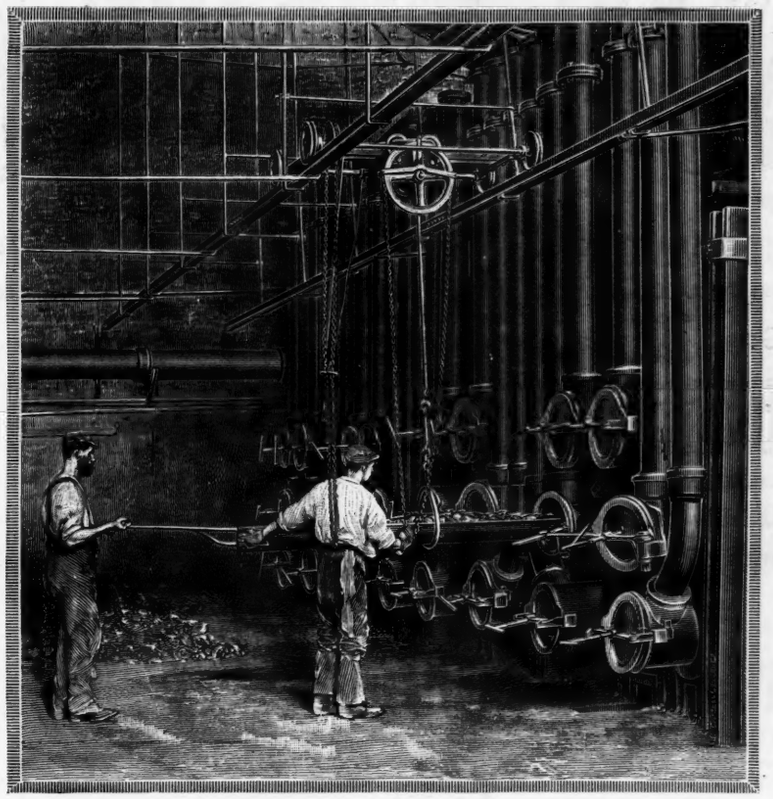

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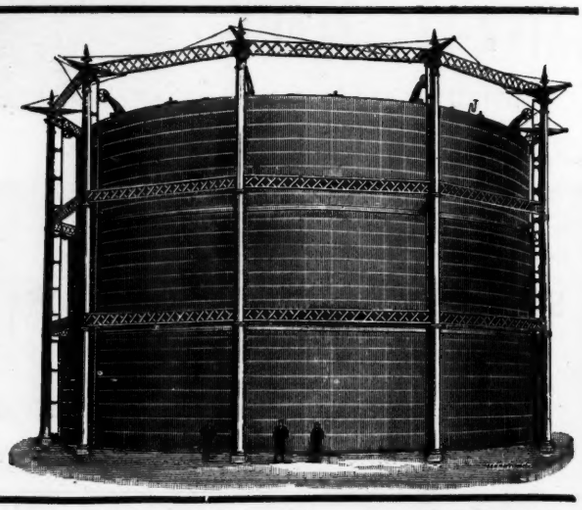

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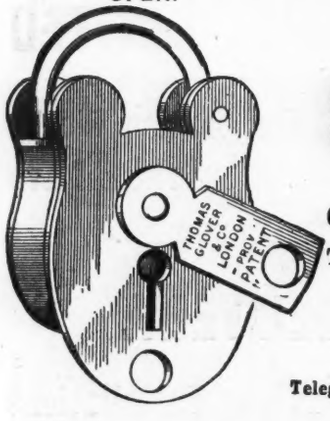

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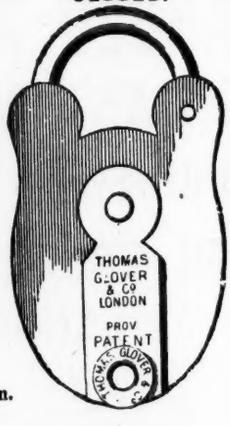

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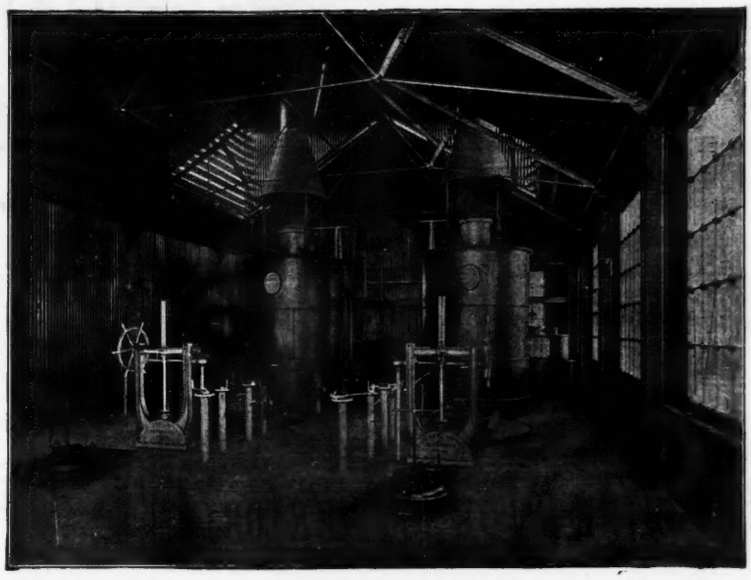
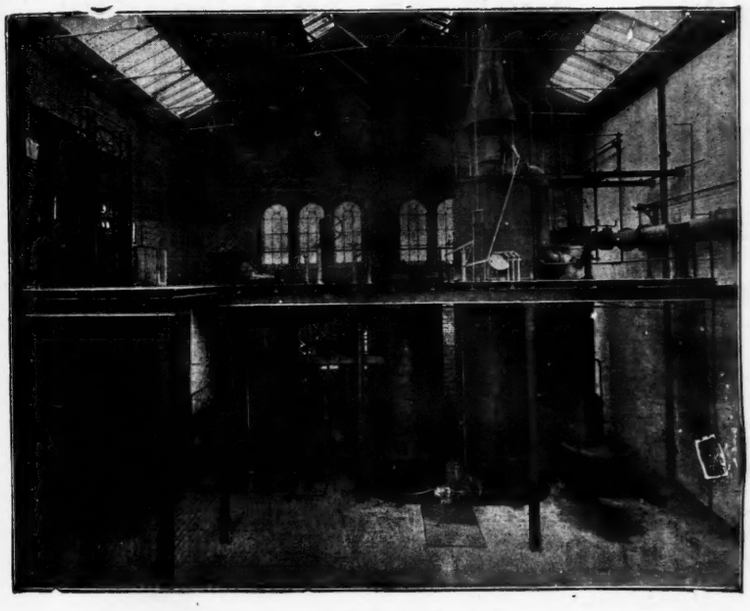


Water-Gas Plant at Southall.



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[See Illustrated Advertisement, Oct. 3, p. 845.]

H. GREENE & SONS, LTD.,
GAS LIGHTING ENGINEERS AND CONTRACTORS.

Fitted with Steel Enamelled White Reflector

The "ST. ALBANS."

Showing "ST. ALBANS" Lantern packed for Export, thus reducing Freight.

Fitted with Porcelain Reflecting Cone.

The "FARRINGDON."

All Lanterns are made of the very best Material and Workmanship,

RAIN AND WIND PROOF.

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Applications for **AGENCIES** now being received.

NOTE THESE FEATURES:

A1. WHITE MANTLES.
Longest Lived and Highest Candle Power.

'SUNLIGHT' TINTED MANTLES.
Strongest and Pleasantest Colour.

These are INTERCHANGEABLE on same Burner.

BURNERS WITH CHIMNEYS.
Cheapest in the Market.

CHIMNEYLESS BURNERS.
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Sunlight Tinted Mantles have been declared by the Courts to be "as far asunder as the Poles" from the Welsbach System, and we guarantee that our

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We give with every Mantle sold an absolute indemnity to both seller and user against all molestation on this account.

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SOCKET-PIPES FOR GAS OR WATER PURPOSES.

FLANGE PIPES FOR STEAM.

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ATTERTON'S PATENT APPARATUS for CHARGING RETORTS.

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WORTLEY FIRE-CLAY WORKS,
Near LEEDS,

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ON THE CONTINUOUS SYSTEM

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Old Systems easily and cheaply converted.

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LIGHT SYNDICATE,

THE

PIONEERS OF NO CHIMNEYS,

still hold their own on the market for the

HIGHEST
CANDLE POWER

for each Cubic Foot of Gas at ordinary Pressures.

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The Syndicate works under the

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and Bandsept, who was the first to adopt the Injector Principle, is

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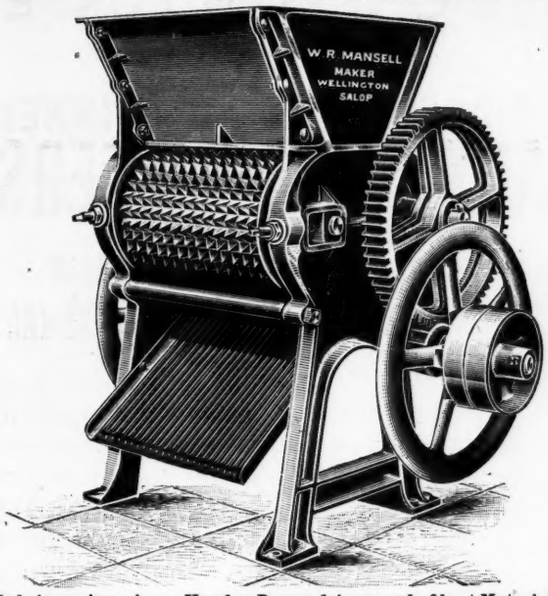

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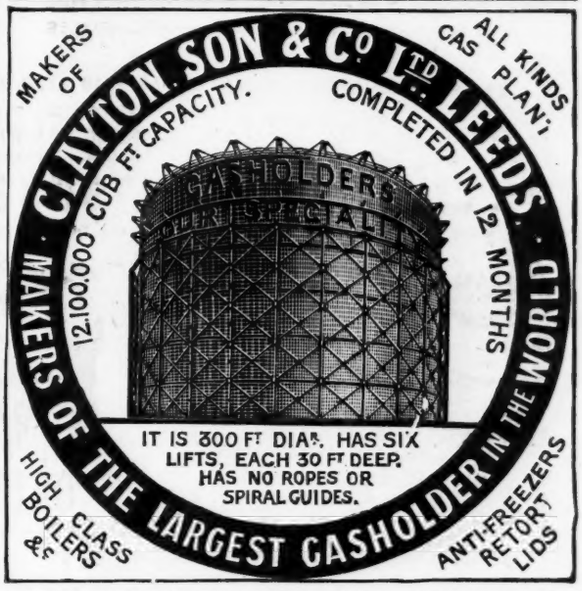
UNSURPASSED FOR QUALITY AND VALUE.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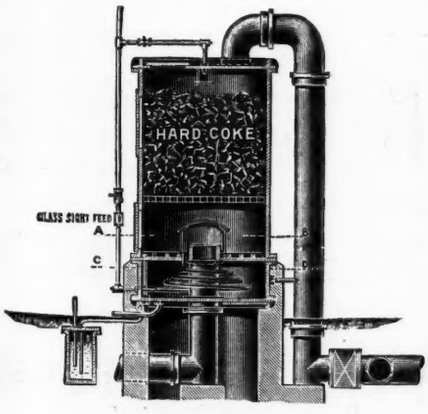

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FOR ENRICHING COAL GAS, AND FOR

DISSOLVING AND PREVENTING NAPHTHALENE DEPOSITS

IN GAS-MAINS.

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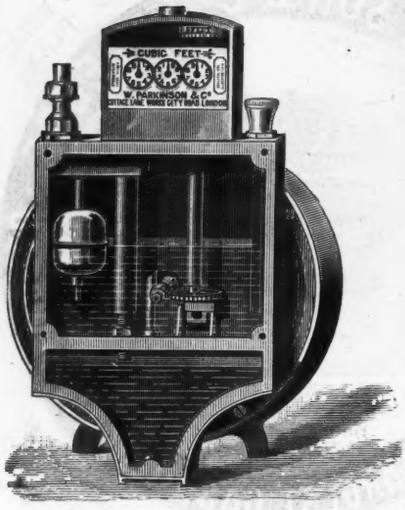

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IN CAST-IRON CASES.

Work with very little friction. Will stand very high pressures. Cannot possibly be shut off by sudden increase of pressure, the Float being affected by Outlet Gas only. Allow for loss of water by evaporation without materially affecting the registration or shutting off the gas. Unexcelled for simplicity of construction, excellence of workmanship, or accuracy in registration.

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IN TINNED OR CAST-IRON CASES.

The Slow-Spoon Compensator has been in extensive use for many years; it maintains an unvarying water-line without appreciable friction, and provides a large reserve of water. The Float arrangement allows sudden or excessive pressure on the Inlet without affecting the working of the Meter or extinguishing the Lights.

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These Meters are unsurpassed for accuracy of registration. The cases are made of the best Charcoal Tin Plates; and each part of the Meter is stamped by special Machinery to ensure uniformity and exactness in construction. The Diaphragms are all of the best Persian Sheep Skins, carefully selected, and the brasswork and smaller fittings are of superior workmanship.

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[See also Advt. on p. 1042.

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